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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 122)

DECEMBER 1973

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (122)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 122)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in November 1973 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 343 reports, articles and other documents announced during November 1973 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

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TABLE OF CONTENTS

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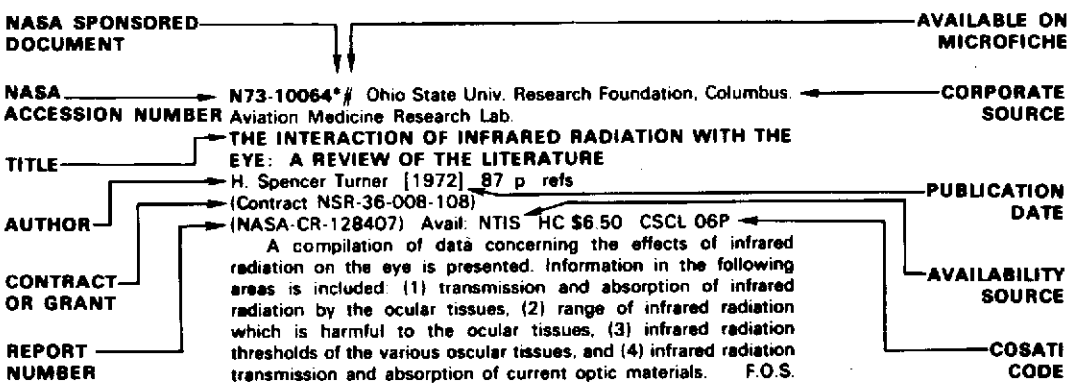

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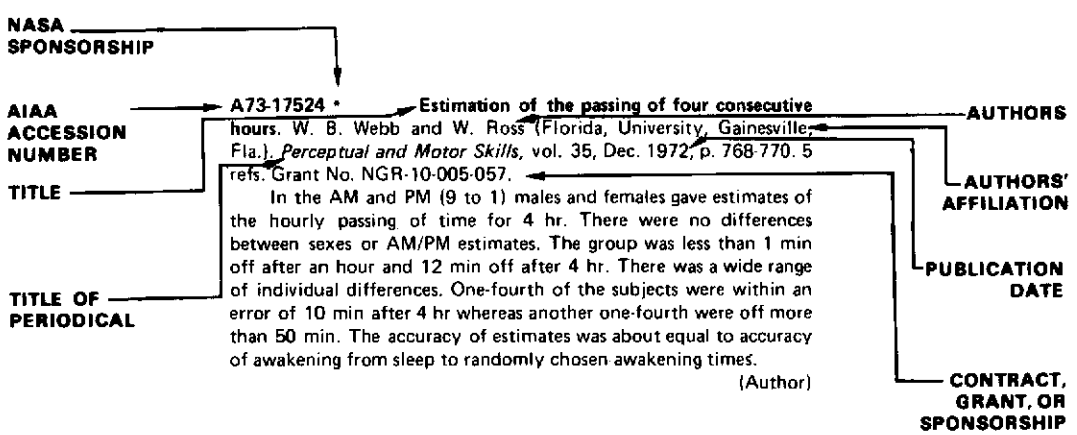

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 122) **DECEMBER 1973**

IAA ENTRIES

A73-40000 **Effect of carbon monoxide on time perception.** R. D. Stewart, P. E. Newton, M. J. Hosko, and J. E. Peterson (Wisconsin, Medical College, Milwaukee, Wis.). *(American Medical Association, Air Pollution Medical Research Conference, Chicago, Ill., Oct. 2, 1972.) Archives of Environmental Health,* vol. 27, Sept. 1973, p. 155-160. 16 refs. Research supported by the Coordinating Research Council and U.S. Environmental Protection Agency.

Twenty-seven healthy, adult, male and female volunteers were exposed to carbon monoxide at concentrations of less than 2, 50, 100, 200, and 500 ppm for periods up to five hours for the purpose of determining the effect of this gas on time perception. These exposures, which resulted in a range of carboxyhemoglobin saturations up to 20%, produced no impairment in the ability of the subjects to perform the Beard-Wertheim time discrimination test, to estimate 10- or 30-second intervals, or to perform the Marquette time estimation test. (Author)

A73-40001 **Pulmonary function in man after short-term exposure to ozone.** M. Hazucha, C. Parent, S. Field (McGill University, Montreal, Canada), F. Silverman (GAGE Research Institute, Toronto, Canada), and D. V. Bates (British Columbia, University, Vancouver, Canada). *(American Medical Association, Air Pollution Medical Research Conference, Chicago, Ill., Oct. 2, 1972.) Archives of Environmental Health,* vol. 27, Sept. 1973, p. 183-188. 19 refs. Research supported by the Medical Research Council of Canada.

Normal subjects, smokers and nonsmokers, were exposed to either 0.37 or to 0.75 ppm ozone for two hours in an environmental chamber. Two hours of intermittent exercise in such atmospheres of ozone produced major changes in the lung function tests derived from the maximal expiratory flow. At higher concentrations of ozone, slightly greater effects were noted in smokers than nonsmokers, but at lower concentrations this difference was not evident. The total lung capacity was not significantly affected by the exposure, but the residual volume increased. This increase is closely related to the changes in the closing volume and indicates an early effect in the small airways. We may conclude that a concentration of 0.37 ppm ozone for a period of two hours is unacceptably high if impairment of pulmonary function is to be avoided in a normal, active population. (Author)

A73-40182 # **Continual mechanochemical model of muscular tissue (Kontinual'naia mekhano-khimicheskaia model' myshechnoi tkani).** P. I. Usik. *Prikladnaia Matematika i Mekhanika,* vol. 37, May-June 1973, p. 448-458. 21 refs. In Russian.

A closed system of equations of motion for a two-phase multicomponent anisotropic continuous medium is derived, with allowance for the mechanochemical processes occurring in it, to describe the behavior of active muscular tissue. The basic hypotheses are formulated on the basis of data concerning the structure and work of the tissue. It is assumed that the phase in which the mechanochemical reactions occur is viscoelastic and that the other phase is elastic. The conservation laws are formulated; rheological equations are derived on the basis of the general principles of continuum mechanics and of irreversible thermodynamics. The model obtained is shown to describe such characteristic properties of muscular tissue as the presence of stresses in the absence of strains, deformation in the absence of loads, and energy dissipation in the state of mechanical equilibrium. V.P.

A73-40209 # **Effect of prior adaptation to cold on the development of experimental hypertonia (Vliianie predvaritel'noi adaptatsii k kholodu na razvitie eksperimental'noi gipertonii).** F. Z. Meerson, N. A. Barbarash, G. Ia. Dvurechenskaia, and L. A. Gorbunova (Akademiia Meditsinskikh Nauk SSSR, Moscow; Ministerstvo Zdravookhraneniia SSSR, Meditsinskii Institut, Kemerovo, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 210, June 11, 1973, p. 1243-1245. 14 refs. In Russian.

Study of the effect of prior adaptation to cold on the development of hypertonia induced in rats by subcutaneous implantation of powdered desoxycorticosterone (DOCC) and the aministering of an aqueous solution of NaCl. The main result of the experiment is found to be that adaptation to cold systematically reduces the consumption of aqueous salt solution when DOCC is introduced into the organism and simultaneously prevents the development of experimental DOCC-salt hypertonia. It is concluded that the introduction of salt into the organism is the decisive etiological factor in the given form of hypertonia and that the decrease in salt intake observed in cold-adapted animals might be the basis of the prophylactic effect of adaptation. A.B.K.

A73-40274 **Effect of acceleration on distribution of lung perfusion and on respiratory gas exchange.** G. von Nieding, H. Krekeler (Krankenhaus Bethanien, Moers, West Germany), K. Koppenhagen (Berlin, Freie Universität, Berlin, West Germany), and S. Ruff (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *Pflügers Archiv,* vol. 342, no. 2, 1973, p. 159-176. 35 refs.

Application of new technical and methodological development as respiratory mass spectrometry and double nuclide perfusion scintigraphy results in more detailed knowledge of the effect of accelerational forces on lung perfusion and respiratory gas exchange. For evaluation of some details of lung perfusion and respiratory gas exchange 20 healthy male subjects were exposed to prolonged hypergravitational stress (2 min, +Gz, +Gx, or -Gy). Distribution of lung perfusion was measured by means of double nuclide perfusion scintigraphy using technetium-99m and iodine-131 microspheres allowing the registration of two phases of pulmonary perfusion in the same subject. PAO2 and PACO2 were measured by continuous mass spectrometrical registration and PaO2, PaCO2, and pHa were determined from arterial blood samples polarographically and electrometrically, respectively. Measurements were performed in the prerun, in the run, and partly in the postrun period, too. Depending on the magnitude and direction of the gravitational vector, blood

volume shifts within the lungs. Using computer evaluation of the scintiscans, it is possible to determine the magnitude of the normal perfused, hypoperfused, and hyperperfused lung regions. (Author)

A73-40276 **Role of the hypothalamus and the limbic system of the brain in regulating vegetative functions (Rol' gipotalamusa i limbicheskoi sistemy mozga v reguliatsii vegetativnykh funktsii).** Edited by N. I. Som. Kiev, Izdatel'stvo Kievskogo Universiteta (Problemy Fiziologii Gipotalamusa, No. 7), 1973. 168 p. In Russian.

Topics discussed concern the role of the hypothalamus and limbic structures of the brain in regulating the activity of the digestive, respiratory, cardiovascular, and endocrine systems, eating and drinking behavior, and the physicochemical properties of the blood. Data are presented concerning the patterns of the interrelations between the large hemispheres, the limbic system of the brain, and the hypothalamus in regulating the functions of the digestive apparatus and food and water intake. Particular attention is paid to the neurosecretor activity of the hypothalamus-hypophysis system, the hypothalamus-thyroid complex, the hypothalamic-gonadotropic function, and formative processes.

A.B.K.

A73-40277 # **High-frequency synchronized activity of the amygdaloid complex as an EEG indicator of certain psychophysiological states (Vysokochastotnaia sinkhronizirovannaia aktivnost' mindalevidnogo kompleksa kak EEG-pokazatel' nekotorykh psikhofiziologicheskikh sostoianii).** P. G. Bogach and B. L. Ganzha (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). In: Role of the hypothalamus and the limbic system of the brain in regulating vegetative functions. Kiev, Izdatel'stvo Kievskogo Universiteta, 1973, p. 3-18. 22 refs. In Russian.

A73-40278 # **The role of the amygdaloid nuclei in the regulation of water intake (Ob uchastii mindalevidnykh iader v reguliatsii potrebleniia vody).** P. G. Bogach and T. G. Karevina (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). In: Role of the hypothalamus and the limbic system of the brain in regulating vegetative functions. Kiev, Izdatel'stvo Kievskogo Universiteta, 1973, p. 32-37. 28 refs. In Russian.

Study of the effect of electrical stimulation of various parts of the amygdaloid complex and of the interaction between this complex and the hypothalamus in the regulation of water intake in dogs. Electrical stimulation of the anterior ventral part of the amygdaloid nuclei under conditions of water deprivation increased drinking excitability in dogs by 5 to 10%. Simultaneous stimulation of this section and the midlateral hypothalamus increased drinking by an average of 30%. Stimulation of posterior ventral structures of the amygdaloid complex sharply reduced drinking excitability, while stimulation of both the hypothalamic drinking center and the afore-mentioned structures led to an increase of only 10 to 12% in drinking excitability. A.B.K.

A73-40279 # **The nature of chemoreception in posterior hypothalamic structures (O prirode khemoretseptsii struktur zadnego gipotalamusa).** A. F. Makarchenko, R. S. Zlatin, and B. A. Roitrub (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). In: Role of the hypothalamus and the limbic system of the brain in regulating vegetative functions.
Kiev, Izdatel'stvo Kievskogo Universiteta, 1973, p. 46-51. 10 refs. In Russian.

Study of the effect of electrical stimulation of posterior hypothalamic structures in rabbits against a background of prior injection of aminasine. It is established that subcutaneous injection of aminasine (5 mg/kg) causes changes in the thermoresistance of plasma proteins which are of different direction in different animals but for the most part tend toward a decrease. The direction of changes in the thermoresistance of plasma proteins after electrical stimulation of posterior hypothalamic structures (the nuclei of the mamillary complex and the lateral hypothalamic region adjacent to them) against a background of prior injection of aminasine is of opposite nature. It is concluded that the posterior hypothalamic structures participating in the regulation of the thermoresistance of blood plasma proteins is of adrenergic nature. A.B.K.

A73-40280 # **Changes in respiration accompanying a diencephalic vegetative-vascular syndrome under the action of a hypoxic mixture (Izmeneniia dykhaniia pri dientsefal'nom vegetativno-sosudistom sindrome pod vozdeistviem gipoksicheskoi smesi).** A. D. Dinaburg, A. D. Lauta, G. N. Maksimova, I. O. Volkov, and L. Ia. Raigorodskaia (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). In: Role of the hypothalamus and the limbic system of the brain in regulating vegetative functions.
Kiev, Izdatel'stvo Kievskogo Universiteta, 1973, p. 58-63. 27 refs. In Russian.

A73-40281 # **Effect of stimulation of the hypothalamus on the pH of arterial and venous blood (Vliianie razdrazheniia gipotalamusa na pH arterial'noi i venoznoi krovi).** P. D. Kharchenko and L. A. Smirnova (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). In: Role of the hypothalamus and the limbic system of the brain in regulating vegetative functions.
Kiev, Izdatel'stvo Kievskogo Universiteta, 1973, p. 81-87. 27 refs. In Russian.

Study of the changes occurring in the pH of arterial and venous blood in rabbits after stimulation of the anterior and lateral parts of the hypothalamus. It is shown that stimulation of the hypothalamus leads in most cases to an increase in the pH of both arterial and venous blood, but in some cases it leads to a decrease. Artificial controlled respiration did not eliminate these changes in blood pH. It is assumed that changes in blood pH are caused by changes in blood gas composition occurring as a result of the action of the hypothalamus on lung ventilation and on pulmonary and systemic regional circulation, and as a result of changes in tissue metabolism. A.B.K.

A73-40282 # **Effect of stimulation of certain hypothalamic structures on systemic and pulmonary circulation (Vliianie razdrazheniia nekotorykh gipotalamicheskikh struktur na krovoobrashchenie v bol'shom i malom krugakh).** A. N. Krasnova and H. van Tam. In: Role of the hypothalamus and the limbic system of the brain in regulating vegetative functions. Kiev, Izdatel'stvo Kievskogo Universiteta, 1973, p. 88-95. 20 refs. In Russian.

Results of measurements of arterial pressure in the femoral artery and the pressure in the right ventricle in anesthetized dogs. Several types of reactions were obtained upon stimulation of the hypothalamus: an increase in arterial pressure and right ventricle pressure in 63.6% of the cases, a decrease in both pressures in 11.8% of the cases, and a decrease in arterial pressure with a simultaneous increase in right ventricle pressure in 6.2% of the cases. Stimulation of the lateral mamillary and supraoptical nuclei in the overwhelming majority of cases caused a 27% increase in arterial pressure and a 50 to 70% increase in right ventricle pressure. Upon stimulation of the ventromedial, lateral, and anterior hypothalamic nuclei both pressor and depressor reactions were obtained. It is concluded that different hypothalamic structures have different effects on the blood circulation and that the hypothalamus may possibly be able to regulate the systemic and pulmonary circulation independently of each other. A.B.K.

A73-40283 # **Reaction of neurocytes of the paraventricular hypothalamic nucleus to unilateral thyroidectomy (Reaktsiia neirotsitov paraventrikuliarnogo iadra gipotalamusa na odnostoronniuiu tireoidektomiiu).** A. N. Ptitsa, L. S. Pobegailo, and K. M. Bilych (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). In: Role of the hypothalamus and the limbic system of the brain in regulating vegetative functions. Kiev, Izdatel'stvo Kievskogo Universiteta, 1973, p. 122-129. 11 refs. In Russian.

A73-40284 # **Influence of electric stimulation of the hypothalamus on catecholamine, phosphorated compound, and cholesterol levels (Vliianie elektricheskoi stimuliatsii gipotalamusa na uroven' katekholaminov, fosfornykh soedinenii i kholesterina).** L. K. Finagin, V. F. Zatokovenko, and R. T. Novikova (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). In: Role of the hypothalamus and the limbic system of the brain in regulating vegetative functions. Kiev, Izdatel'stvo Kievskogo Universiteta, 1973, p. 136-142. 14 refs. In Russian.

A73-40345 **A universal preamplifier for bioelectric signals (Ein universeller Vorverstärker für bioelektrische Signale).** G. Corinth. *Elektronik,* vol. 22, Aug. 1973, p. 277-279. In German.

The amplifier considered makes it possible to conduct electrophysiological routine investigations of various types in clinical medicine. The applications include the amplification of intracellular action potentials. An amplification factor of 100 in connection with the usual sensitivity of the recording device is generally sufficient. The circuit design of the amplifier is considered, together with the results obtained in measurements of the input impedance and the input capacitance for a number of amplifiers. G.R.

A73-40347 **Ocular tension in flying personnel (La tensión ocular en el personal de vuelo).** F. Carrancio de la Plaza. *(Congreso Mundial de Ergoftalmología, 1st, Madrid, Spain, May 1-4, 1973.) Revista de Aeronáutica y Astronáutica,* vol. 33, July 1973, p. 533-536. In Spanish.

The value of a routine investigation of aspects of ocular tension as a part of the schedule of the ophthalmologic tests for the flight crew is discussed. Such an investigation is important for the timely discovery of conditions which could impair the ability of a flight crew member to perform his professional functions. Attention is given to investigations concerning the occurrence of glaucoma and hypertonia ocular in flying personnel. Details of the methods used in the investigations of ocular tension are discussed together with the results obtained in the studies. G.R.

A73-40349 # **Possibilities of barotherapy in ophthalmology (O vozmozhnostiakh baroterapii v oftal'mologii).** I. A. Veller. *Voenno-Meditsinskii Zhurnal,* June 1973, p. 33-36. 6 refs. In Russian.

Consideration of the possibility of using hyperbaric oxygenation to combat retinal hypoxia during an acute disturbance of retinal blood circulation. Findings by other authors concerning the use of hyperbaric oxygenation in the treatment of retinal disorders are reviewed, as well as the results of studies of the effect of such oxygenation on the hemodynamics of the eye in healthy subjects. Finally, the results of radiometric studies (using radioactive phosphorus) concerning the changes occurring in the blood circulation in the front part of the eye and the changes occurring in the permeability of the hemato-ophthalmic barrier during the application of local barotherapy are presented. A.B.K.

A73-40350 # **Effect of certain flight factors on crew efficiency (Vliianie nekotorykh faktorov poleta na rabotosposobnost' letnogo sostava).** N. M. Rudnyi. *Voenno-Meditsinskii Zhurnal,* June 1973, p. 51-55. In Russian.

Consideration of the effect of hypoxia, decompression, acceleration, noise, and vibration on the efficiency of spacecraft crew members. Particular attention is paid to the often subtle effects of hypoxic hypoxia on crew efficiency and to certain factors and conditions which can exacerbate these effects. In particular, the relation between the effects of hypoxia and the pronounced cyclic character of human efficiency is considered, noting the importance of knowledge of diurnal periodic patterns in estimating the effect of even small degrees of hypoxia on crew efficiency. A study is then made of two commonly occurring decompression disorders - high-altitude muscle-joint ailments and high-altitude meteorism, and the effect of repeated flights involving accelerations on pilot efficiency is considered. A few brief comments are made on the effects of noise and vibration under space flight conditions. A.B.K.

A73-40372 * **Prebiotic activation processes.** R. Lohrmann and L. E. Orgel (Salk Institute for Biological Studies, San Diego, Calif.). *Nature,* vol. 244, Aug. 17, 1973, p. 418-420. 20 refs. NASA-NIH-supported research.

Questions regarding the combination of amino acids and ribonucleotides to polypeptides and polynucleotides are investigated. Each of the reactions considered occurs in the solid state in plausible prebiotic conditions. Together they provide the basis for a unified scheme of amino acid and nucleotide activation. Urea, imidazole and Mg(++) are essential catalytic components of the reaction mixtures. However, these compounds could probably be replaced by other organic molecules. G.R.

A73-40408 **Respirator cartridge filter efficiency under cyclic- and steady-flow conditions.** R. G. Stafford, H. J. Ettinger (California, University, Los Alamos, N. Mex.), and T. J. Rowland. *American Industrial Hygiene Association Journal,* vol. 34, May 1973, p. 182-192. 16 refs. AEC-sponsored research.

Tests were performed to define aerosol penetration through respirator filter cartridges under both cyclic and steady flow. A breathing pump was used to simulate different human breathing patterns. Steady-flow conditions were identical to those recommended by the U.S. Bureau of Mines for permissibility tests of respiratory protective devices. Solid monodisperse polystyrene latex aerosols ranging from 0.176 to 2.02 microns in size and liquid monodisperse 0.3-micron dioctyl phthalate were used as the test aerosols. Sampling during cyclic flow was performed without altering the flow pattern through the respirator cartridge. Steady- and cyclic-flow experimental data are compared as a function of aerosol size, breathing pattern, and aerosol type. Theoretical steady-flow aerosol penetration is compared to experimental cyclic-flow data. (Author)

A73-40409 **Effects of single exposures of carbon monoxide on sensory and psychomotor response.** J. M. Ramsey (Dayton, University, Dayton, Ohio). *American Industrial Hygiene Association Journal,* vol. 34, May 1973, p. 212-216. 14 refs. NSF-supported research.

A73-40411 **Miniature eye movement.** R. M. Steinman, G. M. Haddad (Maryland, University, College Park, Md.), A. A. Skavenski (Northeastern University, Boston, Mass.), and D. Wyman. *Science,* vol. 181, Aug. 31, 1973, p. 810-819. 65 refs. Grants No. NIH-EY-325; No. NIH-EY-598; No. NIH-EY-1049.

It is attempted to show that the characteristics and probable functions of miniature saccades made during maintained fixation are not different from the characteristics and probable function of large saccades made during visual exploration. Questions of the origin of modern interest in miniature eye movements are discussed together with relations between miniature eye movements and visibility, the function of saccades as position-correcting reflexes, and efforts to suppress saccades. The human being uses saccades, normally large ones, to search for an objective in his visual world. The question is considered whether the maintained fixation pattern is an overlearned motor habit developed from tiny saccades initially executed voluntarily. G.R.

A73-40413 **Disparity detectors in human depth perception - Evidence for directional selectivity.** D. Regan and K. I. Beverley (Keele, University, Keele, Staffs., England). *Science,* vol. 181, Aug. 31, 1973, p. 877-879. 8 refs. Research supported by the Medical Research Council and Science Research Council.

A new aftereffect of seen motion is reported. The aftereffect cannot be observed monocularly. It provides a clue concerning the way in which the signals from the left and right eyes are combined in

order to produce the sensation of depth. The investigation conducted shows that sensitivity to depth oscillations is markedly reduced if the target is steadily viewed for a period as short as 20 seconds. Threshold settings during 10-second viewings of the stimulus were made in order to minimize effects due to adaptation. On the basis of the test results it is suggested that prolonged viewing will produce appreciable adaptation of class A disparity detectors but little adaptation of class B disparity detectors. G.R.

A73-40438 # Prediction of long-term heat-pipe performance from accelerated life tests. E. Baker (Bell Telephone Laboratories, Inc., Whippany, N.J.). *AIAA Journal*, vol. 11, Sept. 1973, p. 1345-1347.

The main cause of heat-pipe degradation is usually the generation of noncondensable gases which accumulate in the heat-pipe condenser. Although the amount of gas generated is quite small, it can be sufficient to degrade performance significantly. An attempt is made to determine if an Arrhenius model can predict noncondensable gas generation in heat pipes. By using the Arrhenius model, eighteen data points were available to establish the final relationship for hydrogen generation over a wide range of temperatures and times. It is shown that noncondensable gas generation in heat pipes can be described to a first approximation with an activation-process model. F.R.L.

A73-40637 Circulatory reflexes from mechanoreceptors in the cardio-aortic area. C. L. Pelletier and J. T. Shepherd (Mayo Clinic and Mayo Foundation, Rochester, Minn.). *Circulation Research*, vol. 33, Aug. 1973, p. 131-138. 63 refs.

A73-40638 Evaluation of several methods for computing stroke volume from central aortic pressure. C. F. Starmer, P. A. McHale, J. C. Greenfield, Jr. (Duke University; U.S. Veterans Administration Hospital, Durham, N.C.), and F. R. Cobb (U.S. Veterans Administration Hospital, Durham, N.C.). *Circulation Research*, vol. 33, Aug. 1973, p. 139-148. 19 refs. Grants No. PHS-PH-43-NHLI-67-1440; No. NIH-HL-09711.

A73-40639 Morphometry of the human pulmonary arterial tree. S. Singhal, R. Henderson, K. Harding (Queen Elizabeth Medical Centre, Birmingham, England), K. Horsfield, and G. Cumming (Midhurst Medical Research Institute, Midhurst, Sussex, England). *Circulation Research*, vol. 33, Aug. 1973, p. 190-197. 19 refs.

From a cast of a human pulmonary arterial tree, the diameter, length, order, and end branches of all intact branches down to those 0.8 mm in diameter were measured and corrections for broken branches were made. A sample of structures smaller than these (0.8-0.1 mm) was similarly measured. The values for branches less than 0.1 mm in diameter were found by extrapolation and comparison with known data for the precapillary vessels. Therefore, data or estimates for each order of branching in the pulmonary tree were obtained and calculations of cross-sectional area, volume, and flow were made. (Author)

A73-40640 * Nonlinear analysis of aortic flow in living dogs. S. C. Ling, H. B. Atabek, W. G. Letzing, and D. J. Patel (National Institute of Health, National Heart and Lung Institute, Bethesda, Md.; Catholic University of America, Washington, D.C.). *Circulation Research*, vol. 33, Aug. 1973, p. 198-212. 20 refs. Grants No. PHS-HE-12083-05; No. NGL-09-005-067.

A nonlinear theory which considered the convective accelerations of blood and the nonlinear elastic behavior and taper angle of the vascular wall was used to study the nature of blood flow in the descending thoracic aorta of living dogs under a wide range of pressures and flows. Velocity profiles, wall friction, and discharge waves were predicted from locally measured input data about the pressure-gradient wave and arterial distention. The results indicated that a major part of the mean pressure gradient was balanced by convective accelerations; the theory, which took this factor into account, predicted the correct velocity distributions and flow waves. (Author)

A73-40750 # Effect of convulsions on certain aspects of the biosynthesis of proteins in the brain cortex (Deistvie sudorog na nekotorye storony biosinteza belkov v kore golovnogo mozga). Zh. A. Chalabian (Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR). *Akademiia Nauk Armianskoi SSR, Doklady*, vol. 56, no. 2, 1973, p. 107-110. 6 refs. In Russian.

A73-40751 # Automatic identification of cardiac rhythm and conductivity disturbances with the aid of digital computers (Ob avtomaticheskom raspoznavanii narushenii elektronno-vychislitel'nykh mashin). Z. L. Dolabchian, E. M. Krishchian, E. Kh. Slkuni, and N. G. Tatinian (Ministerstvo Zdravookhraneniia Armianskoi SSR, Institut Kardiologii, Armenian SSR). *Akademiia Nauk Armianskoi SSR, Doklady*, vol. 56, no. 2, 1973, p. 123-128. In Russian.

Development of an algorithm for automatic analysis of 57 different types of heart rhythm and conductivity disturbances. The proposed algorithm is based on formalized medical logic and employs 18 diagnostic criteria which assume values of 1 or 0, depending on the corresponding parameters of the investigated electrocardiogram. Then, in accordance with medical logic, 22 Boolean functions of the 18 above-mentioned Boolean variables are calculated. Each of the Boolean functions corresponds to a diagnostic group. The problem of choosing the functions required for the division into diagnostic groups and determining the sequence in which these functions are to be investigated is discussed. A.B.K.

A73-40808 * # Interaction between radiation effects, gravity and other environmental factors in Tribolium confusum. C. H. Yang and C. A. Tobias (California, University, Berkeley, Calif.). *COSPAR, Plenary Meeting, 16th, Konstanz, West Germany, May 23-June 5, 1973, Paper.* 20 p. 12 refs. NASA-AEC-supported research.

The development of the flour beetle, Tribolium confusum, was studied through all stages of its life cycle. The results show that for each environmental factor there is a limited range of values within which the organisms are able best to survive and that this optimum range of survival becomes smaller when additional stresses are imposed upon the organism. This has been shown for external temperature, oxygen content of the atmosphere, gravity compensation, and radiation. On Biosatellite II it was shown that Tribolium pupae irradiated in spaceflight exhibited more wing abnormalities than ground controls. Later it was shown that gravity compensation, when combined with irradiation, can induce a similar effect at ground level. F.R.L.

A73-40815 # Chemical protection from genetic damages induced by radiation in the period of aftereffect of acceleration. M. D. Pomerantseva, V. V. Antipov, G. A. Vilkina, and B. S. Gugushvili (Akademiia Nauk SSSR, Moscow, USSR). *COSPAR, Plenary Meeting, 16th, Konstanz, West Germany, May 23-June 5, 1973, Paper.* 16 p. 7 refs.

Study of the ability of cystamine (150 mg/kg) to provide protection against genetic damage induced by gamma-radiation in germ cells of mice of the CBA strain (at doses of 100, 300, and 600 r). The application of cystamine reduced the frequency of dominant lethal mutations induced by radiation in sperms, spermatids, and spermatocytes. The degree of protective action of cystamine depended on the radiation dose and was two to three times lower than the lethal effect of radiation at the organism level. Under the aftereffect of transverse acceleration (15 units/10 min) the protective effect of cystamine against dominant lethal mutations induced by radiation (300 r) decreased on the average by one-third. The action of transverse acceleration somewhat reduced the radiosensitivity of

germ cells. The introduction of the protector and preliminary acceleration did not affect the frequency of reciprocal translocations induced by radiation in spermatogonia. (Author)

A73-40861 # **A study of the statistical patterns of visual perception of a black and white raster image (Issledovanie statisticheskikh zakonomernostei zritel'nogo vospriiatiia cherno-belogo rastrovogo izobrazheniia).** V. V. Voronezhtsev (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Geodeziia i Aerofotos'emka*, no. 2, 1973, p. 101-109. 6 refs. In Russian.

Results of experiments in which subjects were required to distinguish both threshold and optimal differences between pairs of black and white raster images. An analysis is made of the reliability of identification of raster images for different numbers of information gradations. It is found that the optimal number of gradations that can be simultaneously distinguished in black and white raster images does not exceed seven. On the basis of an analysis of black and white raster images from the standpoint of improving thematic maps (for both computer and visual calculation), recommendations are made concerning the use of the statistical patterns revealed in the tests. A.B.K.

A73-40863 # **A descriptive model of multi-sensor human spatial orientation with applications to visually induced sensations of motion.** L. R. Young, C. M. Oman, R. E. Curry (MIT, Cambridge, Mass.), and J. M. Dichgans (Neurologische Universitätsklinik, Freiburg im Breisgau, West Germany). *American Institute of Aeronautics and Astronautics, Visual and Motion Simulation Conference, Palo Alto, Calif., Sept. 10-12, 1973, Paper 73-915.* 5 p. 12 refs. Members, $1.50; nonmembers, $2.00.

A73-41011 **Clinical applications of spectral analysis and extraction of features from electroencephalograms with slow waves in adult patients.** J. Gotman, D. R. Skuce, C. J. Thompson, P. Gloor, J. R. Ives and W. F. Ray (McGill University; Montreal Neurological Institute, Montreal, Canada). *Electroencephalography and Clinical Neurophysiology*, vol. 35, Sept. 1973, p. 225-235. 20 refs. Medical Research Council of Canada Grants No. MT-3140; No. MA-3821; No. ME-3822.

A73-41012 **Symmetry of the visual evoked potential in normal subjects.** T. Harmony, J. Ricardo, G. Otero, G. Fernández, S. Llorente, and P. Valdés (Centro Nacional de Investigaciones Científicas, La Habana, Cuba). *Electroencephalography and Clinical Neurophysiology*, vol. 35, Sept. 1973, p. 237-240. 12 refs.

Homologous pairs of visual evoked potentials (VEP) obtained from 139 normal subjects subjected to four different measures of symmetry, using central, ocipital and temporal monopolar, and centro-occipital and occipito-temporal bipolar derivations, are presented. This normative study provides a framework usable in the evaluation of reported asymmetries pertaining to pathological conditions. M.V.E.

A73-41013 **Variations in the motor potential with force exerted during voluntary arm movements in man.** J. T. Wilke and R. W. Lansing (Arizona, University, Tucson, Ariz.). *Electroencephalography and Clinical Neurophysiology*, vol. 35, Sept. 1973, p. 259-265. 13 refs.

Review of the results obtained from utilizing a computer averaging technique for scalp recorded EEGs in the identification of differences attributable to the force of movement exerted by human subjects trained to perform a simple forearm extension in a uniform way against two different conditions of force opposing movement. The subjects always knew how much force they had to exert to execute the movement precisely. The results include the finding that a surface negative-to-positive deflection which appeared after movement began had a greater amplitude in the greater force condition for all subjects. M.V.E.

A73-41024 # **In praise of biodegradation (Eloge de la biodégradation).** C. de Duve (Leuven, Katholieke Universiteit, Louvain, Belgium; Rockefeller University, New York, N.Y.). *Société Royale des Sciences de Liège, Bulletin*, vol. 42, no. 3-4, 1973, p. 156-162. In French.

Degradation, although by its nature the antagonist and the enemy of synthesis, is nonetheless its indispendable collaborator in the service of evolution. This rule, already imposed for prebiotic processes, becomes even more evident when vital phenomena are contemplated. It is quite evident that everything which implies change, i.e., adaptation, differentiation, transformation, development, genesis and, in the last analysis, evolution, depend as much on the power to destroy that which exists, as on the power to elaborate that which is to come. Various biodegradation processes are described in some detail. F.R.L.

A73-41080 **Did life originate in interstellar space (Entstand das Leben im interstellaren Raum).** Ch. Trefzger (Max-Planck-Institut für Astronomie, Heidelberg, West Germany). *Orion*, vol. 31, Aug. 1973, p. 107-109. In German.

The occurrence of molecules in interstellar matter is discussed, giving attention to emission nebulosities and dark nebulae. Molecules and radicals detected include CH, CN, CH(+), OH, ammonia, water, CO, HCN, CS, HNCO, methyl alcohol, and formic acid. It appears that molecular clouds occur preferably at locations where stars are formed from dense interstellar clouds of gas. These molecules can possibly provide the raw materials for the origin of life in the case of planets with favorable conditions. G.R.

A73-41130 # **Relationship between cyclic AMP, phosphodiesterase activity, calcium and contraction in intestinal smooth muscle.** R. G. G. Andersson (Linkoping, University, Linkoping, Sweden). *Acta Physiologica Scandinavica*, vol. 87, Mar. 1973, p. 348-358. 40 refs.

A73-41131 # **Oxygen uptake, muscle high-energy phosphates, and lactate in exercise under acute hypoxic conditions in man.** H. G. Knuttgen and B. Saltin (Gymnastik- och Idrottshogskolan, Stockholm, Sweden). *Acta Physiologica Scandinavica*, vol. 87, Mar. 1973, p. 368-376. 13 refs. Research supported by the Délégation Générale à la Recherche Scientifique et Technique and Statens Medicinska Forskningsrad.

Five healthy male subjects in an above-average state of physical condition and endurance training were employed in the investigation. All subjects underwent pretesting for the determination of maximal oxygen uptake during normoxic conditions and during acute exposure to ambient hypoxia. Exercise consisted of cycling for exactly 4 min at 50 rpm on a cycle ergometer. The average decrease in maximal aerobic power for the subjects at altitude was 19 per cent. On the basis of the results of the investigation it has been hypothesized that the return to resting levels by the high-energy phosphates in muscle is one of the processes occurring during the

first few minutes of recovery which is related to the fast component of the oxygen debt. G.R.

A73-41132 # Oxygen uptake during maximal work at lowered and raised ambient air pressures. L. Fagraeus, J. Karlsson, D. Linnarsson, and B. Saltin (Karolinska Institutet; Gymnastik- och Idrottshogskolan, Stockholm, Sweden). *Acta Physiologica Scandinavica,* vol. 87, Mar. 1973, p. 411-421. 37 refs. Research supported by the Statens Medicinska Forskningsrad. SMRC Project 40X-682; SMRC Project 40X-2203.

The maximal aerobic power was measured in 12 subjects exercising on a bicycle ergometer breathing air at 0.68, 1.0 and 1.40 ATA ambient pressures. Seven of the subjects were also investigated at 2.0 and 3.0 ATA. It is concluded that moderate hyperoxia produced by increased ambient air pressure enhances circulatory transport of oxygen in maximal exercise, and that the working muscles have an aerobic potential exceeding what the circulation normally can offer. (Author)

A73-41139 # Studies on the metabolism of glucose-1,6-diphosphate in human erythrocytes. G. Gerber, E. Winczuk, and S. Rapoport (Berlin, Humboldt-Universität, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 30, no. 6, 1973, p. 759-771. 33 refs.

An investigation is conducted concerning the changes of the G1,6P concentration of intact human erythrocytes under varying experimental conditions. In addition, the formation and degradation of this metabolite is studied in stroma-free haemolysates and with partly purified phosphofructokinase. The determination of G1,6P in whole blood is discussed together with determinations in intact erythrocytes. G.R.

A73-41140 # Automatic apparatus for the study of conditioned reflexes in a monkey seated in the primatological chair (Automatische Apparatur zur Ausarbeitung bedingter Reflexe bei Affen im primatologischen Stuhl). F. Wolter, T. G. Urmantscheeva, H. Baumann, W. A. Chasabova, and G. Martin (Deutsche Akademie der Wissenschaften, Zentralinstitut für Herz- und Kreislauf-Regulationforschung, Berlin, East Germany; Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Acta Biologica et Medica Germanica,* vol. 30, no. 6, 1973, p. 841-847. In German.

The apparatus makes it possible to employ combinations of four optical and four acoustical signals together with a conditioned nutrition and a conditioned defense reaction. Details of apparatus design are considered together with the principles of operation involved, questions of the application of the apparatus, and the first results obtained in a number of investigations. The device is useful in the evaluation of the conditions of higher nervous activities. G.R.

A73-41151 Effects of repeated simulated sonic booms of 1.0 PSF on the sleep behavior of young and old subjects. W. E. Collins and P. F. Iampietro (FAA, Civil Aeromedical Institute, Oklahoma City, Okla). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 987-995. 20 refs. U.S. Department of Transportation Contract No. FA70AC-1125-3.

Investigation of the effects on sleep of simulated sonic booms occurring regularly during the night over a consecutive 12-night period. Possible effects of the booms on subjective states and on objective measures of performance were also examined. Individual booms did arouse ECG, EMG, and BSR responses in all subjects. The response frequency tended to increase with age. The responses were functionally mild: only 5% of the booms produced awakenings and only 14% produced shifts in sleep stages. Mood scores and performance measures showed no deleterious effects of booms. M.V.E.

A73-41152 # Physiologic cost of prolonged double-crew flights in C-5 aircraft. H. B. Hale, B. O. Hartman, D. A. Harris, R. E. Miranda, and E. W. Williams (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 999-1008. 15 refs.

One double crew was studied during four standardized transoceanic flying missions in C-5 aircraft from Delaware to South Vietnam and back. Urine specimens collected at 4-hr intervals were analyzed for epinephrine, norepinephrine, 17-hydroxycorticosteroids, potassium, sodium, urea, and creatinine. In general, the results confirm and extend the findings for a double crew which flew long-duration missions in C-141 aircraft, indicating that physiologic entrainment remains at all times the principal determinant of endocrine-metabolic responsiveness to factors in the flying environment, including the work itself. Recovery from these long missions (average duration = 65 hr) involved differential reversal among the flight-affected endocrine-metabolic functions. Extrapolations of postflight data suggest that the time for complete recovery exceeded the flight time. (Author)

A73-41153 # Interactive effects of intense noise and low-level vibration on tracking performance and response time. C. S. Harris and H. C. Sommer (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 1013-1016. 7 refs. U.S. Environmental Protection Agency Contract No. IAG-0181(D); Contract No. F33615-72-C-1488.

Attempt to determine whether the intensity differences in noise level can account for differences in the effects of noise and vibration on tracking performance. Approximately the same procedures were used in the present study with 110-dB noise as were used previously in a study where a subtractive effect was obtained with 100-dB noise. The performance of 12 subjects was measured during two conditions of noise, 60 dB and 110 dB, and two conditions in which these noise exposures were combined with 0.10 Gz (vertical) vibration at 6 Hz. Noise produced a detrimental effect on tracking task performance, and the effect was additive to the adverse effect produced by vibration when both noise and vibration were presented simultaneously. These results, along with the results of the previous experiments, demonstrate that as noise level is increased from 100 to 110 dB the combined effect of noise and vibration changes from subtractive to additive. (Author)

A73-41154 Studies of pilot performance. III - Validation of objective performance measures for rotary-wing aircraft. C. E. Billings, R. J. Gerke, R. C. Chase, and J. J. Eggspuehler (Ohio State University, Columbus, Ohio). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 1026-1030. 5 refs. Contract No. DA-49-193-MD-2615.

Nine subjects whose fixed-wing piloting experience varied from zero to several thousand hours were given primary helicopter flight training in a Hiller 12-E (CH-23G) helicopter. The vehicle was instrumented to permit recording of rotor velocity and the positions of all flight controls. Computer reduction of the resulting data revealed differences in the precision with which rotor velocity was controlled between the flight instructors and their students, and systematic trends in the students' control of engine rpm during their flight instruction. These findings support the hypothesis that rpm variability is a valid index of pilot skill in helicopters in which this variable is under the direct control of the pilot. (Author)

A73-41155 Stress and strain in student helicopter pilots. C. E. Billings, R. J. Gerke, R. C. Chase, and J. J. Eggspuehler (Ohio State University, Columbus, Ohio). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 1031-1035. 27 refs. Contract No. DA-49-193-MD-2615.

The heart rates of nine volunteer subjects were studied during 223 hours of primary helicopter flight training. Heart rates after flights were generally higher than before the same flights. Heart rates on the ground tended to increase over 20 to 25 hours of flight instruction. This trend toward increases in heart rates was also observed during dual flights, whether the instructors or students were flying. During solo flight, in contrast, heart rates tended to decrease in most students. Student heart rates were highest during flight checks in eight of nine subjects. It is concluded that these data are

indicative of a moderate and sequentially increasing level of psychological stress in students undergoing dual flight instruction in helicopters. (Author)

A73-41156 Relationship between organ weight and blood flow in rats adapted to simulated high altitude. A. Tucker and S. M. Horvath (California, University, Santa Barbara, Calif.). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 1036-1039. 18 refs. Grant No. AF-AFOSR-73-2455.

A73-41157 Physiological and operational state of a group of aeroplane pilots under the conditions of stressing tracking tests. H. Strasser, G. Brilling, K. P. Klinger, and W. Müller-Limmroth (München, Technische Universität, Munich, West Germany). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 1040-1047. 15 refs. Research sponsored by the Bundesministerium der Verteidigung.

A test set-up is described with which a picture of the operational and physiological state of a group of pilots during a period of about 2 hours was obtained. The results recorded for tracking performance with both fixed and adaptive self-adjusting degrees of difficulty, together with the simultaneous recording of the heart rate, sinus arrhythmia, and acoustically evoked potentials, were compared with the figures obtained from a control group. Through the combination of the parameters measured it could be demonstrated that the group of pilots had an above-average level of performance in the tracking tests, as well as a high capacity for prolonged mental concentration. A relatively small acute alcohol effect, which cannot be separated from the natural effects of training by means of the operational data, is clearly shown in the parameter of evoked potentials that describes information processing by the central nervous system. (Author)

A73-41158 Frequency of anti-collision observing responses by solo pilots as a function of traffic density, ATC traffic warnings, and competing behavior. M. F. Lewis (FAA, Aviation Psychology Laboratory, Oklahoma City, Okla.). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 1048-1050. 10 refs.

A73-41159 Changes in the peripheral blood of the rat exposed to microwave radiation /2400 MHz/ in conditions of chronic exposure. Z. Djordjevic and A. Kolak (Institute of Aviation Medicine, Belgrade, Yugoslavia). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 1051-1054. 14 refs.

A73-41160 Barotrauma in United States Air Force accidents/incidents. S. T. Lewis (USAF, Inspection and Safety Center, Norton AFB, Calif.). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 1059-1061.

Some barotrauma-caused AF aircraft accidents and incidents are reviewed, and the accident-causing barotrauma potential is discussed. It is pointed out that in all fatal aircraft accidents, military and civilian, barotrauma must be considered as a possible cause and a thorough autopsy is absolutely essential. M.V.E.

A73-41161 Functional aging - Present status of assessments regarding airline pilot retirement. S. R. Mohler (FAA, Aeromedical Applications Div., Washington, D.C.). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 1062-1066. 12 refs.

Assessment of the progress made in gerontology during the past 10 years in regard to 'functional' aging, and evaluation of the justification for any revision of the current airline pilot age limit regulations. It is found that no significant progress has been accomplished and no information generated that could justify a revision of the present mandatory airline pilot retirement age of 60. M.V.E.

A73-41162 Ophthalmodynamography in pilots to test internal carotid insufficiency - Comparison of blood-pressure responses. R. N. Mittl and D. Kürschner (Bundesministerium der Verteidigung, Luftwaffe, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 1067-1069. 14 refs.

A73-41163 Monocular pilots - A followup study. H. B. Mayer and J. C. Lane (Department of Civil Aviation, Aviation Medicine Branch, Melbourne, Australia). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 1070-1074.

A prospective survey was made of 203 pilot applicants with defective or absent vision in one eye and 408 matched controls. The monocular pilots' achievement in securing and retaining licences, acquiring endorsements on different aircraft types, and accumulating flying hours, was equal to or better than that of the controls. There is a possibility, which cannot be entirely rejected, that the monocular pilots were involved in more hazardous events than the controls. (Author)

A73-41164 Developments as regards maximum visual acuity with age among cockpit crew members. J. P. Boissin and E. Lafontaine (Compagnie Nationale Air France, Paris, France). *Aerospace Medicine,* vol. 44, Sept. 1973, p. 1075-1077.

A73-41175 Is anyone out there. S. Milton (Cambridge University, Cambridge, England) and R. Lewin. *New Scientist,* vol. 59, Aug. 16, 1973, p. 380-382.

Various hypotheses on the origin of life on earth, the abundance of intelligent life in our galaxy, and the probability of detecting intelligent signals from planets of other solar systems are discussed. Special attention is given to Orgel and Crick's (1971) hypothesis and directed panspermia which suggests that life on earth may have descended from organisms sent here thousands of millions of years ago by extraterrestrial civilizations. M.V.E.

A73-41176 Pure-tone equal-loudness contours for standard tones of different frequencies. J. A. Molino (National Bureau of Standards, Institute for Basic Standards, Washington, D.C.). *Perception and Psychophysics,* vol. 14, Aug. 1973, p. 1-4. 10 refs.

Six high school students between the ages of 16 and 19 years were used in the investigation reported. The subjects listened to an alternating sequence of standard and comparison tones and adjusted the comparison tone until a loudness match was obtained. The experiment permits the comparison of families of equal-loudness contours elaborated by the same subjects with three different standard frequencies. The comparison shows the presence of a distinct difference in the spacing of contours within each family. G.R.

A73-41177 Response delays and the timing of discrete motor responses. A. M. Wing and A. B. Kristofferson (McMaster University, Hamilton, Ontario, Canada). *Perception and Psychophysics,* vol. 14, Aug. 1973, p. 5-12. 6 refs. National Research Council of Canada Grant No. A-7919.

A model for the timing of repetitive discrete motor responses is proposed, and a prediction of negative dependency between successive interresponse intervals is confirmed by data from a Morse key tapping task. A method that makes use of the first-order serial correlation between interresponse intervals is used to distinguish between variance due to a timekeeping process and variance in motor response delays subsequent to the timekeeper. These two quantities are examined as a function of mean interresponse interval. (Author)

A73-41178 Compensating for distortion in viewing pictures obliquely. D. N. Perkins (Harvard University, Cambridge, Mass.). *Perception and Psychophysics,* vol. 14, Aug. 1973, p. 13-18. 9 refs. NSF Grant No. GB-31064.

Gombrich (1972) argues that the eye accepts the obliquely projected image as though it were seen perpendicularly, and makes an accordingly distorted interpretation. An experiment was designed which might counterbalance Gombrich's proposal by demonstrating substantial capacity to compensate for oblique views under common circumstances. The results show that the visual system can compensate for projective distortion in obscuring pictures obliquely, and Gombrich's notion that viewers judge principally by accepting the projected image is brought into question. G.R.

A73-41179 Spiral aftereffect durations following awakening from REM sleep and non-REM sleep. P. Lavie and Z. Giora (Tel Aviv University, Tel Aviv, Israel). *Perception and Psychophysics*, vol. 14, Aug. 1973, p. 19, 20. 15 refs.

A73-41180 A comparison of the Ponzo illusion with a textural analogue. M. B. Fineman and J. Carlson (Southern Connecticut State College, New Haven, Conn.). *Perception and Psychophysics*, vol. 14, Aug. 1973, p. 31-33. 8 refs.

A73-41181 Sufficient conditions for the discrimination of motion. H. H. Bell and J. S. Lappin (Vanderbilt University, Nashville, Tenn.). *Perception and Psychophysics*, vol. 14, Aug. 1973, p. 45-50. 14 refs. Grant No. PHS-MH-21105-01.

When one half of a randomly contoured pattern is displaced in one of four directions between successive exposures, Ss are capable of discriminating the direction of the displacement. Accuracy of discrimination decreases as a function of the relative displacement within the pattern, independent of the visual angle subtended by the pattern. Supplementary data suggest that Ss are unrealistically confident in the accuracy of their discrimination. The results demonstrate that identification of specific contours is not necessary for the discrimination of motion and suggest that some type of correlational process is employed by the visual system in dealing with spatially and temporally displaced patterns. (Author)

A73-41182 Focal and nonfocal processing of color and form. S. C. Peeke and G. C. Stone (California, University, San Francisco, Calif.). *Perception and Psychophysics*, vol. 14, Aug. 1973, p. 71-80. 21 refs. Grants No. PHS-MH-18146; No. NIH-FR-05550.

In the study reported, it was hypothesized that when several stimuli can be presented simultaneously, the tendency to use peripheral and focal processing in parallel will be greater for color stimuli than for form stimuli. This hypothesis was tested in several ways. The results obtained support the hypothesis that the discrepancy in results between Hawkins (1969) and Stone and Peeke (1971) with regard to the relative latencies to color and form stimuli is due to the type of stimulus presentation. It is found that the subject is capable of engaging in more preattentive processing of color stimuli during simultaneous stimulus presentations than can be accomplished with forms. G.R.

A73-41183 Whiteness constancy - Inference or insensitivity. T. P. Friden (New Mexico, University, Albuquerque, N. Mex.). *Perception and Psychophysics*, vol. 14, Aug. 1973, p. 81-89. 21 refs. Research supported by the University of Illinois and University of New Mexico; NSF Grant No. GB-15163.

Both the results of similarity scaling and discriminant analyses with patterned stimuli indicate that the perceived space was two-dimensional, although the axis for perceived illuminance was very short. The data are also consistent with the hypothesis that the persons tested could not separate changes in albedo from changes in illuminance. Rather, they could only judge some inseparable combination of the two. G.R.

A73-41184 Effect of eye movements on backward masking and perceived location. M. L. Davidson, M. J. Fox, and A. O. Dick (Rochester, University, Rochester, N.Y.). *Perception and Psychophysics*, vol. 14, Aug. 1973, p. 110-116. 11 refs. U.S. Department of Health, Education and Welfare Grant No. OFG-2-710371B; Grant No. PHS-1-R03-MH-20911.

The investigation reported involves the successive presentation of five letters, the evocation of an eye movement, and the presentation of a spatially localized mask. The mask suppresses the report of the letter that stimulates the same retinal location. The masking effect is weaker when the eyes move than when they do not. An experiment shows that the spatial aspects of observable stimulus persistence are unaffected by eye movements. G.R.

A73-41185 Visual search, complex backgrounds, mental counters, and eye movements. J. D. Gould (IBM Thomas J. Watson Research Center, Yorktown Heights, N.Y.) and R. Carn (Carnegie-Mellon University, Pittsburgh, Pa.). *Perception and Psychophysics*, vol. 14, Aug. 1973, p. 125-132. 31 refs. Grant No. PHS-MH-07722.

The case in which subjects are required to detect only a single occurrence of a target before classifying the stimulus as positive is investigated together with two cases in which the subjects must detect more than one occurrence of a particular target before they classify the stimulus as positive. A third question studied is related to the changes that a subject's eye movements undergo after a certain time of visual search practice. A comparison is conducted regarding the subject's performance when searching stimuli having plain backgrounds and his performance when searching stimuli having a complex background. G.R.

A73-41186 Visually perceived motion in depth resulting from proximal changes. I, II. H. Marmolin (Uppsala, Universitet, Uppsala, Sweden). *Perception and Psychophysics*, vol. 14, Aug. 1973, p. 133-148. 21 refs. Research supported by the Swedish Council for Science Research and Bank of Sweden.

A study was conducted to quantify the relation between the changing proximal stimulation and perceived motion in depth. Particular attention was given to a test of the specific projective formula for the stimulus-percept relationship given in a model proposed by Johansson (1964). It is found that perceived relative motion cannot be predicted according to the equations of the model. The basic assumption behind the equations may, therefore, be partly invalid. The model would consequently have to be modified in accordance with the result of the study. Other investigations conducted were concerned with the effects of rate of change, perceived initial distance to the perceived object, and absolute amount of change on perceived relative motion in depth. G.R.

A73-41187 The psychophysical inquiry into binocular summation. R. Blake and R. Fox (Vanderbilt University, Nashville, Tenn.). *Perception and Psychophysics*, vol. 14, Aug. 1973, p. 161-185. 106 refs. Grant No. PHS-EY-00590.

Experiments that compare monocular and binocular visual performance of human psychophysical Os on a variety of visual tasks are reviewed. The review attempts to include all experiments published in English in this century, excluding work on stereopsis, rivalry, and evoked potentials. The concept of probability summation as a baseline for assessing the presence of neural summation is discussed, and the assumptions of several models for estimating probability summation are considered. Experiments are classified in terms of visual task, major categories being increment detection, flicker fusion, brightness magnitude, and contour resolution. A major conclusion is that binocular performance is superior for essentially all task categories and in most cases by a magnitude greater than that predicted by appropriate probability summation models. (Author)

A73-41188 Visual adaptation to tilt and displacement - Same or different processes. G. M. Redding (Wisconsin, University, Madison, Wis.). *Perception and Psychophysics*, vol. 14, Aug. 1973, p. 193-200. 26 refs.

Visual adaptation to tilt and displacement were compared to test whether they were dependent on the same or different processes. Although interocular transfer was essentially complete for both transforms, marked differences occurred between the two kinds of optical transforms in terms of rate of adaptation as a function of

exposure time and transform magnitude, level of compensation, and rate of decay. Tilt and displacement appear to be quantitatively different, consistent with the idea of a different locus for each adaptation effect. This conclusion was supported by the absence of a correlation between individual performance under the two transforms. The possibility is discussed that displacement and tilt adaptation involve independent visual systems for the perception of location and form. (Author)

A73-41216 * **Electrofluoroplanigraphy.** N. A. Baily, E. C. Lasser, and R. L. Crepeau (California, University, La Jolla, Calif.). *Radiology*, vol. 107, June 1973, p. 669-671. 7 refs. Grant No. NGL-05-009-103.

The authors describe a fluoroplanigraphic method of synthesizing single-plane sections of any desired layer within the body. This is done by appropriate positioning of the individual images obtained at various locations of the X-ray tube during a single tomographic motion, followed by electronic summation of each roentgenogram. A TV image of any desired body section is available within seconds of the original recording sequence. (Author)

A73-41218 * **Serum tryptophan level after carbohydrate ingestion - Selective decline in non-albumin-bound tryptophan coincident with reduction in serum free fatty acids.** D. Lipsett, B. K. Madras, R. J. Wurtman, and H. N. Munro (MIT, Cambridge, Mass.). *Life Sciences, Part II - Biochemistry, General and Molecular Biology*, vol. 12, no. 2, 1973, p. 57-64. 9 refs. Research supported by the John A. Hartford Foundation and NASA; Grants No. PHS-AM-15364; No. PHS-NS-10459.

A73-41262 # **Biosynthesis of RNA in the brain cortex during various functional states (Biosintez RNK v kore golovnogo mozga pri razlichnykh funktsional'nykh sostoianiiakh).** Zh. A. Chalabian (Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR). *Akademiia Nauk Armianskoi SSR, Doklady*, vol. 56, no. 1, 1973, p. 47-50. 11 refs. In Russian.

Study of the effect of gamma-aminobutyric acid, hexenal, and electrical stimulation of the brain on the biosynthesis of various fractions of RNA in the brain cortex. The study was performed on rats, using a technique of sedimentation of tagged RNA on a saccharose gradient. It is found that nuclear RNA in the brain cortex is sedimented in two distinct cycles - 28S and 18S, with an extinction ratio 28S/18S equal to 2. The specific radioactivity of 18S RNA is higher than that of 28S RNA. Under the action of gamma-aminobutyric acid a decrease in the quantity and specific radioactivity of 18S RNA occurs, and the ratio 28S/18S increases. A slight increase in the specific radioactivity of 28S RNA is also observed. Electrical stimulation leads to an increase in the quantity and specific radioactivity of 18S and to a decrease in the ratio 28S/18S. A.B.K.

A73-41263 # **Evoked potentials in the hypothalamus and mesencephalic reticular formation upon stimulation of the vagus nerve (Vyzvannye potentsialy v gipotalamuse i retikuliarnoi formatsii srednego mozga pri razdrazhenii bluzhdaiushchego nerva).** F. A. Adamian (Akademiia Nauk Armianskoi SSR, Institut Fiziologii, Yerevan, Armenian SSR). *Akademiia Nauk Armianskoi SSR, Doklady*, vol. 56, no. 1, 1973, p. 59-64. 5 refs. In Russian.

A73-41277 # **A formalism of correlative functions for describing neuron networks (Formalizm korreliativnykh funktsii dlia opisaniia neironnykh setei).** S. Kh. Ait'ian and Iu. A. Chizmadzhev (Akademiia Nauk SSSR, Institut Elektroniki, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 210, June 1, 1973, p. 949-952. 6 refs. In Russian.

Development of a mathematical formalism for describing neuron networks with a limited number of communication channels at each neuron. The proposed formalism is based on the use of correlative functions to determine whether a neuron is active and sends identical signal fluxes through all communication channels, or whether it is refractive and either does not receive signals or else stores signals reaching it from neighboring neurons. A.B.K.

A73-41278 # **Influence of preliminary adaptation to the main environmental factors on the ATP level and phosphorylation potential in the myocardium during severe heart strain (Vliianie predvaritel'noi adaptatsii k osnovnym faktoram sredy na kontsentratsiiu ATF i potentsiala fosforilirovaniia v miokarde pri ostroi peregruzke serdtsa).** F. Z. Meerson and L. Iu. Golubeva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 210, June 1, 1973, p. 989-992. 11 refs. In Russian.

A73-41280 # **Structural plasticity of interneuron synapses (Strukturnaia plastichnost' mezhneironnykh sinapsov).** V. P. Babmindra. Leningrad, Izdatel'stvo Leningradskogo Universiteta, 1972. 183 p. 302 refs. In Russian.

The structural and functional plasticity of synapses is studied under conditions corresponding to their readjustment to the damaging effects of various chemical and physical agents. Current knowledge of the morphology of synapses is used as a basis for a detailed description of the structure and ultrastructure of presynaptic endings and post-synaptic regions of interneuron connections. Degenerative and regenerative changes in these structures are examined along with the effects of a variety of factors on these structural modification processes. A large number of original electron microscope photographs is reproduced. T.M.

A73-41289 # **Electrical activity of the human brain in the process of motor action (Elektricheskaia aktivnost' mozga cheloveka v protsesse dvigatel'noi deiatel'nosti).** E. B. Sologub. Leningrad, Izdatel'stvo Meditsina, 1973. 248 p. 414 refs. In Russian.

Problems involving the organization of cortical electrical activity in the human brain when carrying out various motor functions are examined on the basis of EEG records obtained with over 700 healthy adult subjects representing occupations both with and without rhythmic work habits. Details of EEG measurement in the course of motor action are described along with methods of automatic data reduction, processing, and analysis. Substantial attention is given to the phenomenology and nature of slow potentials synchronized with the tempo of movement. Cortical organization of motor acts is treated in terms of the characteristics of intercentral correlations, the phase relationships and functional cortical structures arising in the course of muscular work, the problem of interhemispheric relations, and the participation of higher-order cortical structures in the motor acts. T.M.

A73-41302 **Two visual systems in the frog.** D. Ingle (McLean Hospital, Belmont, Mass.). *Science*, vol. 181, Sept. 14, 1973, p. 1053-1055. 11 refs. Research supported by the Alfred P. Sloan Foundation.

In the study described, it was attempted to dissociate certain behavioral functions of the frog's visual thalamus from those of the optic tectum by using natural orienting behaviors, rather than discrimination training methods. It was found that tectum and thalamus can mediate spatial localizing responses which are morphologically identical but are elicited by different classes of visual stimuli. Monocular frogs without a contralateral optic tectum can quite accurately localize the terminal edge of a barrier. The results of the study reinforce the suggestion that two independent visual systems mediate localization of prey stimuli and of stationary barriers. G.R.

A73-41303 **Curvature as a feature of pattern vision.** L. A. Riggs (Brown University, Providence, R.I.). *Science*, vol. 181, Sept. 14, 1973, p. 1070-1072. 28 refs.

It has been found that rectilinear arrays are not a necessary

feature of patterns that generate color-contingent aftereffects. Curved lines will serve nearly as well, provided that opposite directions of curvature are used for the two inspection patterns in the test described by McCollough (1965). This result would not be predicted by the dipole hypothesis as it was originally stated by Harris and Gibson (1968). A number of alternative concept are examined. It is suggested that an explanation might possibly be provided by a search conducted by electrophysiologists with regard to the existence of cortical cells for detecting the degree and direction of curvature. G.R.

A73-41438 # Mutual relationship of water and salt secretion functions in digestive and excretory organs under conditions of high temperature (Vzaimosviaz' vodo- i solevydelitel'nykh funktsii organov pishchevareniia i vydeleniia v usloviiakh vysokoi temperatury). A. Iu. Iunusov and Z. T. Tursunov. Tashkent, Izdatel'stvo FAN, 1973. 100 p. 302 refs. In Russian.

Published medical literature contains extensive experimental data that unquestionably confirm the presence of a functional relationship between various organs of the digestive tract in general and other organs and systems of the organism in particular. The present work provides analysis and interpretation of original experimental data collected over many years on relationships between water and salt secretion functions in digestive and excretory organs under conditions of elevated temperature where these functions participate in the conservation of thermal homeostasis. Graphical and tabulated data demonstrate correlations of water and salt secretion in kidneys, salivary glands, stomach glands, and intestinal glands. Data on cortical regulation of these functional correlations among the organs are also included. T.M.

A73-41523 # Effect of training with eccentric muscle contractions on skeletal muscle metabolites. F. Bonde-Petersen, J. Henriksson (Gymnastik- och Idrottshogskolan, Stockholm, Sweden), and H. G. Knuttgen (Boston University, Boston, Mass.). *Acta Physiologica Scandinavica*, vol. 88, Aug. 1973, p. 564-570. 11 refs. Research supported by the Statens Medicinska Forskningsrad and Statens Laegevidenskabelige Forskningsrad, SMRC Project 40X-2203; SLF Project 512-667.

The effect of training with eccentric contractions on skeletal muscle metabolism was investigated with human subjects engaged in cycling exercise. Experiments involving extended (30 min) exercise at high relative intensities were performed before and after a five-week period of training (25 to 30 min per day, 22 days). Muscle biopsies (lateral portion of m. quadriceps femoris) were taken at rest, after 4 min exercise, and termination of exercise. Expired air was collected periodically for determinatin of respiratory exchange. Oxygen uptake and heart rate were lowered by training (e.g., after 26 min of exercise: from an average of 0.96 to 0.74 liters per min and 115 to 96 beats per min, respectively). Muscle metabolite concentration evidenced no significant changes but respiratory exchange ratio was decreased (after 10 and 26 min, from an average of 0.85 to 0.80 in both instances). (Author)

A73-41564 # Effects of beta-blocking agents on atrio-ventricular and intraventricular conduction in man. M. Chapelle, R. Benaim, and G. Lejwi (Hôpital Tenon, Paris, France). *Acta Cardiologica*, vol. 28, no. 3, 1973, p. 238-254. 12 refs.

Administration of beta-blocking agents makes it possible to examine how far the dromotropic effect depends on beta-adrenergic receptors, provided it is possible to separate their chronotropic effects and compare atrio-ventricular and intraventricular conduction delays at identical heart rates. The negative dromotropic effect of 0.4 mg of Pindolol and of 5 mg of Propanolol was examined in 30 patients by recording His bundle potentials under atrial pacing. The effects of vagal tone were eliminated in 17 cases by preliminary injection of 1 mg of atropine. These two beta-blocking agents act on intranodal conduction and are without effect on intraventricular conduction. F.R.L.

A73-41565 # The relationship between left ventricular ejection time and stroke volume during passive cardiovascular stress. S. Wegner and C. M. Agress (Cedars-Sinai Medical Center, Los Angeles, Calif.). *Acta Cardiologica*, vol. 28, no. 3, 1973, p. 284-294. 15 refs. Research supported by the Morjorie Agress Research Committee for Heart.

The use of tilt testing in conjunction with noninvasive measurements presents a convenient approach to the analysis of ventricular function, as such a procedure is simple, quantitative, and easily reproducible. Its usefulness is therefore determined by the degree to which noninvasive methods correlate with direct hemodynamic measurements. The investigation was undertaken to reevaluate (Agress et al., 1967) the applicability of left ventricular ejection time (LVET) for the estimation of stroke volume (SV) during passive cardiovascular stress in normal subjects, induced by alterations of body posture and venous return. A significant correlation was found between changes in LVET and those of SV during both experimental states, while correction of LVET for the effects of heart rate reduced the significance of these relationships. F.R.L.

A73-41600 * Visual field defects after missile injuries to the geniculo-striate pathway in man. F. Koerner and H.-L. Teuber (MIT, Cambridge, Mass.). *Experimental Brain Research*, vol. 18, Aug. 31, 1973, p. 88-113. 33 refs. Research supported by the Foundation Fund of Research in Psychiatry and Alfred P. Sloan Foundation; Grants No. NGR-22-009-308; No. NIH-MH-05673; No. NIH-FR-88.

The main objective of the survey reported was a quantitative comparison of different visual functions at identical retinal points of individual patients. The possibility to develop objective forms of visual-field testing was also explored, taking into account reports by Frydrychowicz and Harms (1940) and Harms (1951). These investigators had insisted that pupillary responses to light are depressed in areas of homonymous scotomata. The shapes of homonymous visual field defects are discussed together with questions regarding the association and dissociation of symptoms. G.R.

A73-41608 Interaction of vision with optical aids. I. Overington (British Aircraft Corp., Ltd., Filton, Bristol, England). *Optical Society of America, Journal*, vol. 63, Sept. 1973, p. 1043-1049. 22 refs.

The various available methods of image-quality measurement and their limitations for assessment of visual aids are surveyed. All major methods of image evaluation are distinctly limited in predictive capability when the human observer is the final element in the chain. A model of visual performance was developed which has predictive capabilities over a wide range of situations when used in conjunction with objective performance data relating to visual aids and the optics of the eye. F.R.L.

A73-41620 Advantage or disadvantage of a decrease of blood oxygen affinity for tissue oxygen supply at hypoxia - A theoretical study comparing man and rat. Z. Turek, F. Kreuzer, and L. J. C. Hoofd (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Pflügers Archiv*, vol. 342, no. 3, 1973, p. 185-197. 26 refs.

A shift of the oxygen dissociation curve (DC) to the right is often interpreted as an adaptation to hypoxia favorable for tissue oxygen supply. However, animals native to high altitude tend to show a rather high oxygen affinity. This apparent discrepancy was investigated by studying the effect of a shift of the DC to the right as reflected in the mixed venous oxygen pressure, and the role of this displacement in pulmonary gas exchange with particular reference to the alveolar-arterial oxygen pressure difference and the pulmonary diffusing capacity for oxygen. Comparison between man (higher affinity) and rat (lower affinity) suggests that animals of small size with high metabolic rate living in normoxic or possibly exposed to moderately hypoxic conditions only are better served by a relatively low oxygen affinity whereas animals native to high altitude are better adapted to sever hypoxia when having a high oxygen affinity. F.R.L.

A73-41621 **The significance of an increased RQ after sucrose ingestion during prolonged aerobic exercise.** A. J. S. Benadé, G. G. Rogers, C. H. Wyndham, N. B. Strydom (Chamber of Mines of South Africa, Johannesburg, Republic of South Africa), and C. R. Jansen (Chamber of Mines of South Africa, Johannesburg; Atomic Energy Board, Pretoria, Republic of South Africa). *Pflügers Archiv*, vol. 342, no. 3, 1973, p. 199-206. 15 refs. Research supported by the South African Sugar Association.

Four subjects worked for periods of 6 hr on bicycle ergometers at work loads requiring about 47 per cent of their maximal aerobic capacity. In one series of studies they received only water; in a second series they received 100 g of sucrose mixed with U-C-14-labelled sucrose at the beginning of the fourth hour of work. In a third series of experiments the same subjects received 100 g of nonlabelled sucrose at the beginning of the fourth hour. It appears that the observed rise in respiratory exchange ratio (RQ) after sucrose ingestion, under the conditions studied, is of metabolic origin, resulting from a complete conversion of pyruvate to carbon dioxide. F.R.L.

A73-41622 **Plasma insulin and carbohydrate metabolism after sucrose ingestion during rest and prolonged aerobic exercise.** A. J. S. Benade, C. H. Wyndham, G. G. Rogers (Chamber of Mines of South Africa, Johannesburg, Republic of South Africa), C. R. Jansen, and E. J. P. de Bruin (Chamber of Mines of South Africa, Johannesburg; Atomic Energy Board, Pretoria, Republic of South Africa). *Pflügers Archiv*, vol. 342, no. 3, 1973, p. 207-218. 35 refs. Research supported by the South African Sugar Association.

A73-41623 **Effect of hypothermia on renal sodium reabsorption.** G. Torelli, E. Milla, L. I. Kleinman, and A. Faelli (Milano, Università, Milan, Italy). *Pflügers Archiv*, vol. 342, no. 3, 1973, p. 219-230. 24 refs.

The relationship between sodium reabsorption and oxygen consumption was studied in an isolated rabbit kidney preparation perfused with blood at 37, 28, and 19 C. When the temperature was lowered from 37 C to 28 C and to 19 C the rate of oxygen consumption and of the maximal para-aminohippuric acid (PAH) excretion decreased more than that of sodium reabsorption. The C sub 10 for sodium reabsorption is about 1.8, while that for maximal PAH excretion is 2.5. Some hypotheses on the possible mechanism of the low Q sub 10 of the Na(plus) reabsorption are suggested. F.R.L.

A73-41624 # **Effect of hind-limb immobilization on contractile and histochemical properties of skeletal muscle.** F. W. Booth and J. R. Kelso (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Pflügers Archiv*, vol. 342, no. 3, 1973, p. 231-238. 24 refs.

Both hind limbs of male rats were immobilized in casts. After four weeks, serial sections of hind limb muscles were stained for myosin ATPase and NADH-diaphorase. The soleus from immobilized limbs had significantly fewer muscle fibers than the control soleus. The soleus from immobilized limbs had a significantly lower percentage and lower number of fibers with low myosin ATPase activity than the soleus from control rats. Immobilization also resulted in the speed of contraction for the soleus being significantly faster than the soleus from control rats. The deep portion of the rectus femoris from immobilized limbs had a significantly smaller percentage of muscle fibers with high NADH-diaphorase activity than did the rectus femoris from control rats. F.R.L.

A73-41625 **Torsional elasticity of human skin in vivo.** R. Sanders (Philips' Gloeilampenfabrieken, Development Laboratories, Drachten, Netherlands). *Pflügers Archiv*, vol. 342, no. 3, 1973, p. 255-260. 5 refs.

Measurements of physical properties of the intact human skin are described. An analysis of the measurements yields parameters that characterize elastic, viscoelastic and plastic properties. Between 6 and 61 years the elastic component of the extensibility of the skin under torsional conditions increase with age. The viscoelastic and plastic components are constant up to the age of forty; at higher ages they show a small tendency to increase. Moduli of elasticity of the intact human skin derived from the torsion measurements yield values between about 20 kN/sq m and 100 kN/sq m, the highest values corresponding to the youngest age. From these values the moduli of elasticity of the elastic fibers in the living skin are estimated between about 2 MN/sq m and 10 MN/sq m. (Author)

A73-41635 **Control of the duration of expiration.** H. Gautier, J. E. Remmers, and D. Bartlett, Jr. (Dartmouth College, Hanover, N.H.). *Respiration Physiology*, vol. 18, July 1973, p. 205-221. 27 refs. Grants No. NIH-1-R01-HL-14330-01; No. NIH-FR-05392; No. NIH-5-R01-HL-02888-16.

The primary purpose of the investigation was to elucidate the mechanical factors responsible for the values of the expiratory interval (t sub e) observed in intact, unanesthetized cats. A second purpose was to investigate the importance of one mechanically determined feedback pathway, the vagus nerve, in determining the duration of expiration. Analysis of the factors that regulate expiratory flow indicates the importance of variations in upper airway resistance brought about by movements of the vocal cords. It is proposed that by this mechanism, via the operation of volume-related feedback, the larynx is a significant determinant of t sub e and the respiratory frequency. F.R.L.

A73-41636 **Peak expiratory flow rate and rate of change of pleural pressure.** J. Clément, M. Afschrift, J. Pardaens, and K. P. Van de Woestijne (Akademisch Ziekenhuis St. Rafael, Louvain, Belgium). *Respiration Physiology*, vol. 18, July 1973, p. 222-237. 24 refs. Research supported by the Fonds voor Wetenschappelijk Geneeskundig Onderzoek.

It has been suggested that the sudden collapse of the large intrathoracic airways occurring at the onset of a forced expiratory maneuver produces an airflow contributing appreciably to the peak expiratory flow rate (PEVR). If so, one expects that PEVR will depend, not only on alveolar pressure, but also on the rate of change of pleural pressure. This relationship was investigated on pleural pressure-flow-volume data measured during rapid expirations in healthy people and in patients with chronic obstructive pulmonary disease. A multiple regression analysis demonstrated, indeed, a partial correlation between peak flow and the rate of change of pleural pressure, especially marked in patients. A model study suggests that the contribution of airway flow to PEVR is more pronounced in patients because of the lower pulmonary static recoil pressure observed in the latter. (Author)

A73-41637 **Blood plasma contamination of the lung alveolar surfactant obtained by various sampling techniques.** R. Reifenrath and I. Zimmermann (Max-Planck-Institut für experimentelle Medizin, Göttingen, West Germany). *Respiration Physiology*, vol. 18, July 1973, p. 238-248. 15 refs. Research supported by the Deutsche Forschungsgemeinschaft.

A73-41638 **A model of diffusion in the respiratory unit.** G. R. Stibitz (Dartmouth College, Hanover, N.H.). *Respiration Physiology*, vol. 18, July 1973, p. 249-257. Grant No. NIH-HL-02888.

Diffusion between the bronchiole and the exchange surfaces of a typical respiratory unit is simulated by that in a simple model having the shape of a figure of revolution. The model is constructed so as to have the same distributions of surface and volume with distance from the port as does the respiratory unit sketched by Miller. Calculated diffusions in the Miller sketch of a unit and in the model are compared. (Author)

A73-41639 **Rebreathing and steady state pulmonary diffusing capacity for O2 in the dog and in inhomogeneous lung models.** P. Scheid, F. Adaro, J. Teichmann, and J. Piiper (Max-Planck-Institut für experimentelle Medizin, Göttingen, West Germany). *Respiration Physiology*, vol. 18, July 1973, p. 258-272. 13 refs. Research supported by the Bergbau-Berufsgenossenschaft.

The results of experiments in anesthetized dogs are described in which both the rebreathing method and the conventional steady state method for determining the pulmonary diffusing capacity for oxygen were applied alternately. The differences in the results of pulmonary diffusing capacity obtained with both methods led to a theoretical investigation of the effects of functional inhomogeneities on the evaluation of pulmonary diffusing capacity with both methods. On the basis of the theory the experimental results of both methods are shown to be compatible with each other. F.R.L.

A73-41642 **Spatial frequency selectivity of a visual tilt illusion.** M. A. Georgeson (Sussex, University, Brighton, England). *Nature*, vol. 245, Sept. 7, 1973, p. 43-45. 22 refs. Research supported by the Medical Research Council.

The investigation of the visual tilt illusion considered provides the first evidence that, in man, orientation-specific inhibition operates between channels which have similar optimal spatial frequencies. The inhibition declines as the difference in frequency increases. The results obtained in the investigation raise the possibility that physically adjacent channels in the human brain respond best to neighboring frequencies, and that their frequency selectivity is enhanced by mutual inhibition. Such a system could overcome the problem of having rather coarse spatial tuning of units at earlier levels in the visual pathway. G.R.

A73-41707 # **Methods for quantifying the effect of noise on people.** J. B. Ollerhead (Loughborough University of Technology, Loughborough, Leics., England). *(British Acoustical Society, Spring Meeting, Chelsea College, London, England, Apr. 25-27, 1973.) British Acoustical Society, Proceedings*, vol. 2, Summer 1973. 4 p.

A chain of subjective response to noise is considered, giving attention to noise exposure, disturbance, annoyance, and complaints. The variation of individual annoyance is considerable. A more direct approach to the problem is to measure disturbance rather than annoyance. An alternative method for scaling noise nuisance is to express it in monetary terms. This has been attempted in numerous cost-benefit and cost-effectiveness studies of airport noise and its control. G.R.

A73-41729 # **Ocular antigens. IV - A comparative study of the localisation of immunogenic determinants of ocular structural glycoproteins in connective tissues of various organs.** J. J. J. M. Van der Eerden and R. M. Broekhuyse (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Ophthalmic Research*, vol. 5, no. 2, 1973, p. 65-76. 18 refs.

A73-41730 # **Performance decrement, under prolonged testing, across the visual field.** L. Ronchi and G. Salvi (Istituto Nazionale di Ottica, Arcetri, Italy). *Ophthalmic Research*, vol. 5, no. 2, 1973, p. 113-120. 22 refs. Grant No. AF-AFOSR-72-2409.

The dark-adapted retina is presented with a cyclical stimulation of brief flashes of near threshold luminance. The plot of perception probability (recorded across each 30-sec exposure) versus time shows a damped oscillatory behavior. The time constant of the decay process is found to increase as eccentricity exceeds, say, 30 deg. This effect is discussed by taking into account some psychophysical data recorded by stimulating the two eyes, in succession, and after inspection to the time course of cortical evoked potential under prolonged testing. (Author)

A73-41731 # **Conditional computer analysis of the onset-to-onset duration of spikes from the electromyographic interference pattern of extraocular muscles.** A. Magora and B. Gonen (Hadassah University, Hospital, Jerusalem, Israel). *Ophthalmic Research*, vol. 5, no. 3, 1973, p. 168-176. U.S. Department of Health, Education, and Welfare Grant No. 19-P-58055-F-01.

A73-41732 # **Glycogen content in the rabbit retina in relation to blood circulation.** D. Kaskel, O. Hockwin, U. Metzler, and C.-M. Schedtler (Bonn, Universität, Bonn, West Germany). *Ophthalmic Research*, vol. 5, no. 3, 1973, p. 177-185. 14 refs.

A73-41735 **Individual and simultaneous tracking of a step input by the horizontal saccadic eye movement and manual control systems.** E. D. Megaw and W. Armstrong (Birmingham, University, Birmingham, England). *Journal of Experimental Psychology*, vol. 100, Sept. 1973, p. 18-28. 20 refs. Social Science Research Council Grant No. HR-982/1.

A73-41736 **Effect of lateral body tilts and visual frames on perception of the apparent vertical.** G. C. Gupta (Delhi, University, Delhi, India). *Journal of Experimental Psychology*, vol. 100, Sept. 1973, p. 162-167. 18 refs.

A73-41787 **Radiofrequency fields - A new ecological factor.** J. Bigu Del Blanco (Queen's University, Kingston, Ontario; National Research Council of Canada, Control Systems Laboratory, Ottawa, Canada), C. Romero-Sierra (Queen's University, Kingston, Ontario, Canada), and J. A. Tanner (National Research Council of Canada, Control Systems Laboratory, Ottawa, Canada). In: International Electromagnetic Compatibility Symposium, New York, N.Y., June 20-22, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 54-59. 41 refs.

The role of RF fields as a new and fundamental ecological factor is discussed. This is justified on the following grounds: (1) the well established interaction of RF radiation with living systems, and (2) the ever growing use of this region of the electromagnetic spectrum that results in a continuous increase in the RF radiation background. A summary of the work conducted in our laboratories on the interaction of RF fields with biological systems is also presented. (Author)

A73-41788 **Mathematics of interaction between blood and electromagnetic fields.** A. Rashid (Boeing Co., Aerospace Group, Kent, Wash.). In: International Electromagnetic Compatibility Symposium, New York, N.Y., June 20-22, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 60-64. 12 refs.

The effects of electromagnetic energy on the human system are reviewed. The interaction between blood and electromagnetic energy is considered as the basic mechanism responsible for unexplained effects to the human system(s). Based upon this consideration, basic magnetohydrodynamic mathematical equations are presented. These equations relate the electric and magnetic field intensities to the velocity, density, pressure, and temperature of blood. Equations are also presented relating the change in velocity, density, pressure and temperature of blood when it is exposed to electromagnetic fields. (Author)

A73-41789 **Human perception of moderate strength low frequency magnetic fields.** O. H. Schmitt and R. D. Tucker (Minnesota, University, Minneapolis, Minn.). In: International Electromagnetic Compatibility Symposium, New York, N.Y., June 20-22, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 65-70.

If humans cannot perceive even subliminally that they have been immersed in or removed from a 60 Hz magnetic field of a few gauss strength, comparable with the maximal value to be found around domestic or ELF communication systems, then it becomes very improbable that these fields have deleterious effects. With whole body immersion in a large Helmholtz coil field, some few individuals demonstrate perception scores absolutely impossible by chance, but as they are tested with acoustically quiet sources and with better and better isolation from auxiliary nonmagnetic clues, fewer and fewer individuals show significant perception and none develop the very

high scores found for sensitive subjects in the open coil systems. With an acoustically sealed isolation cabinet now being tested, perception scores may approach negligibility. (Author)

A73-41815 * # Loudness changes resulting from an electrically induced middle-ear reflex. W. J. Gunn (NASA, Langley Research Center, Hampton, Va.). *Acoustical Society of America, Journal*, vol. 54, Aug. 1973, p. 380-385. 20 refs. Research supported by the University of Cincinnati and U.S. Army; Grant No. NGL-33-008-118.

An experiment was conducted in order to determine the changes in loudness brought about by electro-cutaneous elicitation of the middle-ear reflex. Subjects were required to judge the relative loudness of the second of three consecutive 30-msec bursts of tone, the second tone being accompanied by an electrical shock to the external auditory meatus, capable of eliciting a contraction of the middle-ear muscles. The difference between these judgments and those of the control condition (shock on the arm) was taken to represent a measure of the attenuation provided by contraction of the middle-ear muscles. Test tones were 500, 1000, 2000, and 3000 Hz at levels of 65, 75, 85, 95, and 105 dB. The results indicate that the middle-ear reflex decreases the middle-ear's transmission mainly for low-frequency sounds. The results fail to lend support to the Loeb-Riopelle hypothesis that the middle-ear reflex acts as a limiter, rather than a linear attenuator. (Author)

A73-41816 # The pattern-transformation model of pitch. F. L. Wightman. *Acoustical Society of America, Journal*, vol. 54, Aug. 1973, p. 407-416. 13 refs. NIH-supported research.

A new approach to pitch perception is outlined which is based on what might be called auditory pattern recognition. The general approach is formalized in a mathematical model, the so-called 'pattern-transformation model.' In this model an acoustic stimulus is first transformed by the sense organ into a pattern of peripheral neural activity. This peripheral pattern is assumed roughly to represent the power-spectrum of the stimulus. Thus the temporal fine structure of the stimulus is virtually ignored; the model is phase-insensitive. The peripheral pattern is then assumed to be Fourier-transformed into another pattern of activity. This second pattern roughly represents the autocorrelation function of the stimulus. Pitch is derived from the positions of maximal activity in this pattern. From preliminary tests it appears that the model can successfully predict the pitch of many types of complex stimuli. (Author)

A73-41865 # Investigation of the nature of biological rhythm sensors by means of automatic networks (Doslidzhennia prirodi biologichnikh datchikiv ritmu za dopomogoiu avtomatnikh sitok). L. V. Reshod'ko (Kiivs'kii Derzhavnii Universitet, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seriia B - Geologiia, Geofizika, Khimiia i Biologiia*, vol. 35, June 1973, p. 547-550. 7 refs. In Ukrainian.

The contraction of muscle tissues or muscle cell aggregates, computer-modeled with the aid of a discrete excitable Wiener medium analog in the form of an automatic network, is used to study the nature of biological rhythm sensors. The computed contraction curves of the model indicate a contraction character variability range that includes rhythmic, periodic, and random-aperiodic contractions. Possibly involved factors and parameters are discussed. M.V.E.

A73-41874 # Safety in handling rocket weapon systems (Bezopasnost' ekspluatatsii raketnogo oruzhiia). N. K. Supakov. Moscow, Voenizdat, 1972. 80 p. 19 refs. In Russian.

General safety principles in the production and handling of rocket systems are outlined, and measures of protecting rocket systems from such factors as high-frequency magnetic fields, noise and vibration effects, ionizing radiation, and fire are examined. Safety measures during the maintenance, transportation, preliminary checking, and launching of rocket weapons under combat conditions are examined, and means of improving safety levels are discussed. V.P.

A73-41884 Psychological problems of activity regulation (Psikhologicheskie voprosy reguliatsii deiatel'nosti). Edited by D. A. Oshanin and O. A. Konopkin. Moscow, Izdatel'stvo Pedagogika, 1973. 208 p. In Russian.

The topics discussed concern certain psychological mechanisms underlying the self-regulation of activity in humans. In particular, studies are made of the operativeness of images, the dynamics of operative images, the role of dynamic images in controlling developing events, bioelectric correlates of differences between evoked potentials, operative images in the form of directed graphs, the perception of objects located at different distances from the viewer, operative adjustment in evoked potentials, the role of subjective adjustment to task duration in achieving effective activity regulation, estimating the probability relations between alternative signals, and the effect of exercise on the dependence of the response time on the number of alternatives. A.B.K.

A73-41885 # The operativeness of an image of a controlled process (Ob operativnosti obraza kontroliruemogo protsessa). D. A. Oshanin and A. M. Zal'tsman. In: Psychological problems of activity regulation. Moscow, Izdatel'stvo Pedagogika, 1973, p. 13-22. In Russian.

Consideration of the role of the sample image in mediating the control of a dynamic object represented by a cyclic variative cosinusoidal process consisting of normal and emergency cycles. It is shown that during a change in an activity task an operative reorganization occurs not only in the images which reflect the static characteristics of the object but also in the images which reflect its dynamics and serve as operative sample images during the control of the dynamics. A.B.K.

A73-41886 # The dynamics of operative images in extrapolation tracking processes (K voprosu o dinamike operativnykh obrazov v protsessakh slezheniia s ekstrapoliatsiei). D. A. Oshanin, M. A. Kremen', and V. P. Kulakov. In: Psychological problems of activity regulation. Moscow, Izdatel'stvo Pedagogika, 1973, p. 23-31. In Russian.

Investigation of the specific features of formation and the function of a dynamic operative image during extrapolation tracking. It is shown how this image, formed initially during the pre-extrapolation period - i.e., during tracking of the visible motion of the target, reacts to the operations of the operator in the absence of any further external information concerning the successive positions of the target. Certain time characteristics of the process of formation of an operative image during extrapolation tracking of a target moving along a sinusoidal path are ascertained, the special features of the time scanning of the image are demonstrated, and it is established that the operator transfer function in this case corresponds to the dynamics of either a differentiating element or a delay element. A.B.K.

A73-41887 # A dynamic image of spatiotemporal structure (Dinamicheskii obraz prostranstvenno-vremennoi struktury). D. A. Oshanin and V. I. Morosanova. In: Psychological problems of activity regulation. Moscow, Izdatel'stvo Pedagogika, 1973, p. 32-50. 9 refs. In Russian.

Consideration of the reflection by man of events developing in time and of the role played by dynamic images in controlling these events. An important variety of this type of images are dynamic images of spatiotemporal structures. With the aid of an elementary laboratory model of a cyclic spatiotemporal structure it is shown that an image of such a structure is formed in stages and that the process of disintegration of dynamic images of spatiotemporal structures occurs in an order opposite to the order of their formation. A.B.K.

A73-41888 # Bioelectric correlates of individual differences (O bioelektricheskikh korreliatakh individual'nykh razlichii). E. M. Rutman. In: Psychological problems of activity regulation.

Moscow, Izdatel'stvo Pedagogika, 1973, p. 51-55. In Russian.

Study of the physiological mechanisms underlying certain individual differences in the behavior of test subjects. In particular, a comparison is made between the characteristics of background evoked potentials in two test groups during the presentation of paired flashes with intervals between them ranging from 100 to 500 msec. The results obtained from this test demonstrate the changes occurring in the functional state of different nervous systems in response to an impending activity. A.B.K.

A73-41889 # **Effect of the information panel structure on operator activity (Vliianie struktury paneli informatsii na deiatel'nost' operatora).** A. M. Zal'tsman. In: Psychological problems of activity regulation. Moscow, Izdatel'stvo Pedagogika, 1973, p. 56-69. In Russian.

Study of the special features of the operative image formed in test operators learning to control a continuous chemical-technological process. Analyzing sketches which were spontaneously drawn by the subjects in the course of mastering an instruction-description of the object and which gradually assume the form of complete functional schemes, it is shown that all of these sketches, regardless of their differences, may be reduced to a single scheme which constitutes an image of the functional structure of the object in the form of a directed graph. This graph-scheme then serves as the basis for an experimental variant of an object information panel. A.B.K.

A73-41890 # **Effect of reduction of an unfixed object (Effekt umen'sheniia nefiksirovannogo ob'ekta).** A. I. Mirakian. In: Psychological problems of activity regulation. Moscow, Izdatel'stvo Pedagogika, 1973, p. 70-86. 11 refs. In Russian.

Study of the functional mechanism of operative reflection by a human viewer of the spatial properties of objects located at different distances from the viewer. On the basis of an analysis of the fluctuations occurring in the subjects' indices as they equalize the magnitudes of objects at different distances, an effect consisting of an apparent reduction of an unfixed object is found to be at the root of these fluctuations. This effect, as a specific functional distortion, enables the viewer to perceive the magnitudes of two objects at different distances operatively - i.e., in different manners, depending on the tasks he is required to perform. A.B.K.

A73-41891 # **Bioelectric correlates of operative adjustment (Bioelektricheskie korreliaty operativnoi nastroiki).** E. M. Rutman and V. K. Mul'darov. In: Psychological problems of activity regulation. Moscow, Izdatel'stvo Pedagogika, 1973, p. 87-94. 11 refs. In Russian.

Consideration of the effector links in the process of conversion of information in an object action into a material reaction to the object. An attempt is made to determine whether the functional readiness for such a reaction manifests itself in the characteristics of the evoked potentials and, if so, in what manner. It is concluded that the occurrence of operative adjustment in evoked potentials does not reduce to a general, nonspecific change in the level of activation in the wakefulness-sleep continuum, but causes relatively specific changes in the functional state of the nervous system which correspond to the nature of the anticipated activity. A.B.K.

A73-41892 # **Effect of a subjective ambiguity estimate concerning the duration of work on activity regulation (Vliianie sub'ektivnoi otsenki neopredelennosti otnositel'no prodolzhitel'nosti raboty na regulirovanie deiatel'nosti).** O. A. Konopkin and V. V. Luchkov. In: Psychological problems of activity regulation. Moscow, Izdatel'stvo Pedagogika, 1973, p. 129-153. 12 refs. In Russian.

Consideration of the role of subjective adjustment to a certain work duration in achieving effective regulation of data processing activity. It is shown that for a reliable realization of this activity it is necessary that the human operator know the duration of the work he is to perform. This knowledge is a necessary component of a subjective model of the working conditions which ensures effective activity regulation. Ambiguity regarding the time at which the work terminates inevitably generates certain psychic processes and phenomena which act as specific interferences in the overall functional regulation system, impeding the realization of the psychic processes required for successful activity regulation. These interferences selectively deform the work of certain functional links in the overall regulation system. A.B.K.

A73-41893 # **Ability of a human operator to estimate the probability characteristics of alternative stimuli (O sposobnosti cheloveka otsenivat' veroiatnostnye kharakteristiki al'ternativnykh stimulov).** O. A. Konopkin and Iu. S. Zhuikov. In: Psychological problems of activity regulation. Moscow, Izdatel'stvo Pedagogika, 1973, p. 154-197. 45 refs. In Russian.

Review of data concerning the ability of a human operator to achieve an involuntary, unconscious reflection of the probability qualities of signals. It is shown that the result of such a reflection is the formation of unconscious psychophysiological adjustments to the relative frequency of various signals. These adjustments are regarded as a mechanism of unconscious regulation of data-processing activity, by means of which the dynamics of the probability relations between signals are reflected in a change in the speed of the reactions to various alternative signals. Voluntary reflected probability characteristics of two alternative signals can become the object of a conscious estimate, in which case the subjects are capable of making a fairly accurate estimate of the real probability relations between these signals. A.B.K.

A73-41894 # **Effect of exercise on the response time in an identification problem (Vliianie uprazhneniia na skorost' otveta v zadache opoznaniia).** A. K. Osnitskii. In: Psychological problems of activity regulation. Moscow, Izdatel'stvo Pedagogika, 1973, p. 198-206. In Russian.

Analysis of response time dynamics under conditions where the subject, in reacting to the stimuli, is able to take into account the nature of the changes in the experimental situation. The effect of exercise on the response time was observed in experiments with different numbers of alternatives. It is shown that in the course of exercise the slope of the curve expressing the dependence of the response time on the number of alternatives may vary (decreasing or increasing), depending on the tactics chosen by the subject. A.B.K.

A73-41958 # **Effect of the stimulation of nonspecific thalamic nuclei on spontaneous and evoked spindles in the auditory cortex (Vliianie razdrazheniia talamicheskikh nespetsificheskikh iader na spontannye i vyzvannye veretena slukhovoi kory).** S. P. Narikashvili, D. V. Kadzhaia, and A. S. Timchenko (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 70, Apr. 1973, p. 181-184. 5 refs. In Russian.

A73-41961 **Examination of a multiple dipole inverse cardiac generator, based on accurately determined model data.** R. E. Ideker, D. A. Brody, J. W. Cox, Jr., and F. W. Keller (Tennessee, University, Memphis, Tenn.). *Journal of Electrocardiology,* vol. 6, Aug. 1973, p. 197-209. 13 refs. Grants No. NIH-HL-01362; No. NIH-HL-09495; No. NIH-HL-14032.

The multiple dipole array is a model of cardiac electrical activity whose elements are dipoles which are fixed in location and orientation to correspond to specific regions of the heart. The dipole moments are constrained to positive or zero values so that the dipoles always point outward from endocardium to epicardium. An array of this type was examined for its ability to reflect the dipole moments of each region of the 'Coriolis' generator (a biventricular model of the electromotive forces of the canine heart). Dipole strengths of the array were calculated inversely from simulated surface potentials which would have been created by the Coriolis

generator if it had been placed in a bounded, spherical, homogeneous medium. Although inversely computed dipole strengths of the original array represented dipole moments of regions of the right ventricle and septum of the Coriolis generator very poorly, a modified array indicated adequately the combined moments of these two structures. (Author)

A73-41964 # **Influence of small electromagnetic-field fluctuations on the bioelectric activity of the human brain (Vliianie slabykh perepadov elektromagnitnykh polei na bioelektricheskuiu aktivnost' mozga cheloveka).** V. D. Mikhailova-Lukasheva, A. V. Skripal', V. P. Mel'nikov, and V. P. Korotkii (Akademiia Nauk Belorusskoi SSR, Sektor Gerontologii, Minsk, Belorussian SSR). *Akademiia Nauk BSSR, Doklady*, vol. 17, July 1973, p. 672-674. 7 refs. In Russian.

Preliminary analysis of data obtained with seven subjects revealed a pronounced difference in their response to weak electromagnetic fields applied to the frontal cavity. At a frequency of 400 Hz, distinct changes in bioelectric activity were observed for 6 subjects, and only for 4 subjects at frequencies between 2 and 10 Hz. The most pronounced decrease in bioelectric activity at 2 to 10 Hz was observed in the beta, alpha, and delta rhythms of the EEG, while at 400 Hz, the bioelectric activity of these rhythms increased in most cases. V.P.

A73-42053 **A comparison of predicted skin temperatures with thermographic measurements.** T. J. Love, J. E. Francis, and J. D. Haberman (Oklahoma, University, Norman, Okla.). In: Symposium on Temperature, 5th, Washington, D.C., June 21-24, 1971, Proceedings. Part 3. Pittsburgh, Instrument Society of America, 1972, p. 2065-2072. 12 refs.

A simple one dimensional model of the type utilized by Pennes, Wissler, and Chato is applied with modified boundary conditions to predict skin temperatures of the thorax. A solution of the modeling differential equation is presented in terms of the dimensionless variables such that the thermographic practitioner may utilize the curves to predict skin temperatures or to utilize skin temperature measurements as a method of estimating physiological variables. A series of thermograms showing calibrated isotherms on the anterior female thorax is presented along with predicted temperatures based on estimated tissue properties, blood perfusion rates, and metabolic heating. (Author)

A73-42054 **Design considerations and applications of gradient layer calorimeters for use in biological heat production measurement.** H. F. Poppendiek and G. L. Hody (Thermonetics Corp., San Diego, Calif.). In: Symposium on Temperature, 5th, Washington, D.C., June 21-24, 1971, Proceedings. Part 3. Pittsburgh, Instrument Society of America, 1972, p. 2079-2088. 5 refs.

A73-42055 * **Thin-film temperature sensor.** J. Maserjian (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). In: Symposium on Temperature, 5th, Washington, D.C., June 21-24, 1971, Proceedings. Part 3. Pittsburgh, Instrument Society of America, 1972, p. 2159-2167. 8 refs. NASA-sponsored research.

A new device has been developed for sensing small and rapid temperature changes accompanying biochemical reactions. The active element consists of an evaporated thin-film capacitor having a relatively strong temperature dependence. This dependence is derived from electron trapping effects in the thin amorphous dielectric film. A voltage output of at least 50 mV/deg can be obtained prior to amplification by using a resonant ac bridge circuit operating at 100 kHz. The corresponding noise output for a 10 kHz bandwidth can with an optimum circuit be as low as 4 microvolts. Therefore, the minimum detectable temperature change would be 80 microdegrees at 10 kHz. Rapid thermal response is assured by supporting the thin-film capacitor on a thin anodic tantalumoxide film suspended across an electrolytically etched window in a tantalum foil. (Author)

A73-42073 # **A model to predict the mechanical impedance of the sitting primate during sinusoidal vibration.** R. G. Edwards and J. F. Lafferty (Kentucky, University, Lexington, Ky.). *American Society of Mechanical Engineers, Design Engineering Technical Conference, Cincinnati, Ohio, Sept. 9-12, 1973, Paper 73-DET-78.* 7 p. 14 refs. Members, $1.00; nonmembers, $3.00. Contracts No. F33615-72-C-1112; No. F44620-62-C-0127.

Description of a novel approach to quantifying the coefficients of a biovibrational model. Unanesthetized Rhesus monkeys were exposed to vertical sinusoidal vibrations at discrete frequencies from 2 to 30 Hz at 0.5 and 1.0 g acceleration amplitudes. With the subjects in a sitting position whole-body mechanical velocity impedance was obtained from measurements of vibration exciter velocity, transmitted force, and the phase relationship between velocity and force. The data obtained were applied to a two-mass, single-degree-of-freedom model to determine the coefficients of elasticity and damping as a function of frequency and body mass. The coefficients were obtained for each test at each frequency by requiring the impedance of the model to match that of the primate. (Author)

A73-42158 **Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972.** Meeting sponsored by COSPAR. Edited by P. H. A. Sneath. Berlin, East Germany, Akademie-Verlag GmbH, 1973. 288 p.

Recent advances in quarantine technology are discussed, giving attention to the analysis of planetary quarantine requirements, polurethane foam sterilization by the gas method, safety margins in the implementation of planetary quarantine requirements, Antarctica as a Martian model, and the survival of bacterial isolates exposed to simulated Jovian trapped radiation belt electrons and solar wind protons. Biological implications of recent Mars findings and related topics are considered, together with new medical, physiological, and general biological results of space flights; problems of gravitational biology in plants; problems of gravitational biology in men and animals; and radiobiology of heavy particles. G.R.

A73-42159 # **Developments in the analysis of planetary quarantine requirements.** O. E. Reynolds (American Physiological Society, Washington, D.C.). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 3-7.

Experimental and analytical studies have been carried out to improve the estimation of the parameters and factors which are used to define spacecraft decontamination and sterilization needs. These efforts have made it possible to estimate the microbial burden, biocidal effects of interplanetary environment, and the probability of viable organisms being released on a planet. As a result of this work, compliance with international agreements can be ensured with minimum burden upon future space flight missions. (Author)

A73-42160 # **Polyurethane foam sterilization by the gas method.** V. I. Vashkov, V. M. Tsetlin, L. B. Chudnova, and N. V. Kulkova (All-Union Scientific Research Institute of Disinfection and Sterilization, Moscow, USSR). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 9-11.

Experimental study of the sorption of ethylene oxide, methyl bromide, and their (1:1.44) mixture by the polyurethane foams prolon and PU-101. Also, the desorption completeness of these gases from the two polymers is investigated. The tests were performed in a sealed-glass setup. M.V.E.

A73-42161 # **Safety margins in the implementation of planetary quarantine requirements.** S. Schalkowsky and I. Jacoby (Exotech Systems, Inc., Washington, D.C.). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting,

Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 13-23.

Estimation of the effect of 'error terms', or uncertainties, in the evaluation of planetary quarantine parameters. The manner in which uncertainties enter into the analysis process is demonstrated, and the alternate approaches to their assessment are described. Particular attention is paid to the relative utility of alternative procedures in achieving the desired minimization of excessive safety margins, on the one hand, and their effect on implementation procedures, on the other. Recommendations are made concerning the treatment of safety margins, as it applies to the specification of planetary quarantine constraints as well as to their implementation. (Author)

A73-42162 * # **Antarctica as a Martian model.** W. V. Vishniac and S. E. Mainzer (Rochester, University, Rochester, N.Y.). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972.
Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 25-31. NSF-NASA-supported research.

Results of a survey of a variety of environments in the dry valleys of Antarctica, ranging from mountain crests to valley floors. The main purpose of the investigation was the determination of active microbial multiplication in the soil. A series of techniques was employed which permitted the detection of bacterial growth in situ. All evidence points to an active growth of micro-organisms in the Antarctic soil in all locations examined. The measurements were supported by electron micrographs of soil films which showed colonial growth covering soil particles. These findings suggest that Antarctica does not serve as a useful model for the Martian environment in evaluating quarantine standards. (Author)

A73-42163 * # **Organic analysis of lunar samples and the Martian surface.** J. Oro and D. Flory (Houston, University, Houston, Tex.). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972.
Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 43-54. 33 refs. Contract No. NAS1-9685.

In addition to the organogenic elements (H, C, N, O, S, P) which are necessary for the synthesis of organic molecules, the lunar samples from Apollo 11, 12, 14, and 15 contain substantial amounts of CO, N2, and CO2 which are released at relatively high temperatures and smaller amounts of more complex organic compounds (e.g., benzene). The lunar surface provides one of the less favorable solar system models for the synthesis of organic compounds; yet small amounts of these compounds have been detected in the returned samples. It is reasonable to assume that the different physical and developmental features of the planet Mars (increased gravitational field, presence of an atmosphere with CO2, CO, and H2O, recent volcanic and tectonic activity, etc.) would favor an increased organic content of the surface of this planet relative to the moon. Therefore the organic molecules present in the Martian soil should be measurable by miniaturized mass spectrometers after fractional distillation or gas chromatographic separation of the volatiles released by moderate heating. (Author)

A73-42164 # **On the mechanism of adaptation of micro-organisms to conditions of extreme low humidity.** S. I. Aksenov, I. P. Bab'eva, and V. I. Golubev (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972.
Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 55-61. 24 refs.

Low humidity is considered one of the main obstacles for life on Mars. Mechanisms of adaptation to extreme low humidity are investigated in asporogenic yeasts. Cryptococcus albidus var. diffluens inhabits the high mountain deserts of the Pamirs and the Tien Shan. The spin-echo nuclear magnetic resonance method shows that different ways of drying do not extract all liquid water from the cells. Residual humidity of the Cryptococcus cells may reach 30%. The polysaccharide capsule of Cryptococcus delays the drying process noticeably and also collects moisture at low relative humidity. The considerable quantity of conserved liquid water allows Cryptococcus to adapt to the great periodic oscillations of relative humidity resulting from the great diurnal temperature changes in the high-mountain deserts. Data obtained indicate the presence of a humidity-regulating mechanism on the cellular level in lower plants. (Author)

A73-42165 # **On the multiplication of xerophilic micro-organisms under simulated Martian conditions.** A. A. Imshenetskii, L. A. Kuziurina, and V. M. Iakshina (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 63-66.

The environmental conditions prevailing on Mars would supposedly favor the existence there of micro-organisms belonging to xerophiles, anaerobes, or micro-aerophiles, oligonitrophiles, which are able to grow in wide temperature intervals. From soil samples taken in deserts and tundra, Antarctic halophilic bacteria, able to grow in liquid media containing 20 to 25% of sodium chloride, were isolated. Some of these cultures appeared to be also osmophilic; they grew at temperatures from 5 to 50 C, and developed on media without a nitrogen source (oligonitrophiles). Of special interest was the halophilic and osmophilic form of Bacillus megaterium isolated from the Nubian desert. In experiments with this bacterium a technique was used under which only the xerophilic form of bacteria are able to develop. This halophilic strain of Bac. megaterium grew satisfactorily under these conditions, as did a halophilic and osmophilic strain of Mycococcus ruber isolated in Antarctica. Both the halophilic strain of Bac. megaterium and that of M. ruber were able to grow under simulated Martian conditions. (Author)

A73-42166 # **Abiogenic radio-chemical synthesis of deoxy-nucleosides.** E. A. Kusicheva and M. A. Khenokh (Academy of Sciences, Institute of Cytology, Leningrad, USSR). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 67-73. 16 refs.

The effect of ionizing radiation on a mixture of dry preparations of purine bases with deoxyribose and ribose has been studied. Irradiation induces synthesis of nucleosides. According to the gel-filtration data and absorption spectra they do not correspond, however, to deoxyadenosine and deoxyguanosine. The synthesis of deoxynucleosides was influenced by the mineral surface on which radiochemical synthesis was accomplished. The results of these studies are of interest for studying the chemical evolution of abiogenically synthesized substances of biological importance. (Author)

A73-42167 # **Some psychological and engineering aspects of the extravehicular activity of astronauts.** E. V. Khrunov. In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972.
Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 91-103.

From analysis of the available data and the results of the author's own investigations during ground training and the Soyuz 4 and 5 flights the following peculiarities of an astronaut's extravehicular activity are established: (1) operator response lag in the planned algorithm; (2) systematic appearance of some stereotype errors in the mounting and dismantling of the outer equipment and in scientific-technical experiments; (3) a high degree of emotional strain and a 30 to 35% decrease in in-flight working capacity of the astronaut compared with the ground training data; (4) a positive influence of space adaptation on the cosmonaut and the efficiency of his work in open space; and (5) the necessity for further engineering and psychological analysis of the astronaut's activity under conditions of long space flight of a multipurpose orbital station. (Author)

A73-42168 # **Effects of space flight factors on the heredity of higher and lower plants.** N. P. Dubinin, E. N. Vaulina, K. V. Kosikov, I. D. Anikseva, E. V. Moskvitin, A. A. Zapadnaia, L. N. Kostina, G. A. Shtraukh, L. M. Kryzhanovskaia, and I. G. Gubareva (Academy of Sciences, Institute of General Genetics, Moscow, USSR). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 105-110. 5 refs.

A study was made of the effects of a long-term space exposure (72 days) aboard the Salyut orbital station on dry seeds of Crepis capillaris (L.) Wallr. and Arabidopsis thaliana (L.) Heynh, haploid and diploid strains of Saccharomyces cerevisiae mutant for adenine locus (ad), and strain LARG-I of Chlorella vulgaris Beijer. It was shown that space factors caused reduced survival of Arabidopsis seedlings and Chlorella and yeast cultures, reduced productivity of Chlorella cells, increased mutability of Chlorella and yeast cells, and increased frequency of chromosome aberrations in cells of Crepis root meristem. There are, however, a few exceptions: cell germination of C. capillaris was enhanced, while mutability of A. thaliana seeds declined. Space factors increased the adverse effects of preflight irradiation on all the parameters of the cultures tested. Space factors had no genetic effect on the objects tested. They have, however, caused a stronger inhibition of seed germination and augmented survival of A. thaliana seedlings and Chlorella cells. (Author)

A73-42169 # **Results of cytogenetic studies of seeds after their extended orbital flight aboard the Salyut orbital scientific station.** L. V. Nevzgodina, Iu. G. Grigor'ev, N. M. Papian, I. S. Skukina, and Iu. V. Farber. In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 111-115. 5 refs.

A73-42171 * # **Biophysical considerations concerning gravity receptors and effectors including experimental studies on Phycomyces blakesleeanus.** C. A. Tobias, J. Risius, and C.-H. Yang (California, University, Berkeley, Calif.). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 127-140. 21 refs. NASA-AEC-supported research.

A73-42172 * # **Effect of free fall on higher plants.** S. A. Gordon (Argonne National Laboratory, Argonne, Ill.). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 155-162. 10 refs. NASA-AEC-supported research.

The influence of exposure to the free-fall state on the orientation, morphogenesis, physiology, and radiation response of higher plants is briefly summarized. It is proposed that the duration of the space-flight experiments has been to brief to permit meaningful effects of free fall on general biochemistry, growth, and development to appear. However, two types of significant effect did occur. The first is on differential growth - i.e., tropism and epinasty - resulting from the absence of a normal geostimulus. For these phenomena it is suggested that ground-based experiments with the clinostat would suffice to mimic the effect of the free-fall state. The second is an apparent interaction between the radiation response and some flight condition, yielding an enhanced microspore abortion, a disturbed spindle function, and a stunting of stamen hairs. It is suggested that this apparent interaction may be derived from a shift in the rhythm of the cell cycle, induced by the free fall. (Author)

A73-42170 # **Human sensorimotor coordination following space flights.** M. A. Cherepakhin, Iu. N. Purakhin, B. N. Petukhov, and V. I. Pervushin. In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 117-121. 10 refs.

The recovery kinetics of cosmonauts who completed the 18-day space flight was followed for 30 days after their return. Muscle tone, indices of muscle strength, and parameters of the functions of the extremities were examined, and the ability to maintain vertical posture was studied (stabilography). Stabilographic studies showed a decrement in the stability of the vertical posture of the cosmonauts. The above alterations were particularly pronounced in the crew members of Soyuz 9. As distinct from the previous flights of the Soyuz spaceships, the crew members of Soyuz 9 showed normality in the regulation of vertical posture only on the tenth day after the flight. One of the reasons for the above alterations in postural regulation may be the decrease in muscle tone noted repeatedly after both of the previous space flights and in experiments with simulation of separate effects of weightlessness. Another reason for the deterioration in postural regulation is probably the changes in interaction between the neutral analysors. A possible reason for the apparent defects in stability may be the disturbance of the interaction between various muscle groups - i.e., the disturbance in synergism which is required for the maintenance of vertical posture. (Author)

A73-42173 # **Effects of space flight factors on Drosophila.** N. P. Dubinin, Ia. L. Glembotskii, E. N. Vaulina, T. Ia. Grozdova, E. M. Kamshilova, N. I. Ivashchenko, I. A. Kholikova, G. S. Nechitailo, A. L. Mashinskii, and E. K. Iordanishvili (Academy of Sciences, Institute of General Genetics, Moscow, USSR). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 163-165.

Drosophila melanogaster flies of strain D-32 were exposed aboard the Soyuz 10 spaceship. An insert with a nutritional medium and insects was placed in a small onboard thermostat (Biotherm II) providing a constant temperature (24 plus or minus 1 C) for Drosophila development. The frequency of dominant lethals was determined in the females. Dominant, autosomal and sex-linked recessive lethals were estimated in hatching virgin males and females; the time of hatching was rigorously fixed. Sex-linked recessive lethals were related to certain stages of gametogenesis. The 1 to 5 oocyte stage showed an increased sensitivity to space-flight factors as regards the frequency of both dominant and recessive lethals. (Author)

A73-42174 * # **Effects of gravity on ontogeny in animals.** G. C. Pitts (Virginia, University, Charlottesville, Va.). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 171-176. 30 refs. Contract No. NAS2-1554.

Inversion or clinostat rotation of frogs' eggs demonstrated a critical period of enhanced gravity-sensitivity prior to the first cleavage. These results were corroborated by centrifugation studies which localized the period of maximal sensitivity at approximately 20 minutes post-fertilization. Eggs of various invertebrates suspended in aqueous solution proved capable of normal development following brief ultracentrifugation. Among fly larvae, grasshopper nymphs, turtles, mice, rats, and chickens, growth rates were inversely related to G-force, and maximal chronic acceleration tolerated was inversely related to body size. Body composition data demonstrated the importance of separately evaluating fat and the fat-free portion of the body in studies of the effect of acceleration on growth in homeotherms. The attempt to evaluate the effect of weightlessness on the development of frogs' eggs in Biosatellite 2 was inconclusive for technical reasons. (Author)

A73-42175 # **Biomechanics of locomotion in subgravity.** R. Margaria (Milano, Università, Milan, Italy). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 177-185. 12 refs.

On the moon the same speed of locomotion as on earth can be

reached by shifting to a different mechanism of locomotion - i.e., progression by jumps, which becomes possible on the moon because of the reduction of the body weight. The energy cost of locomotion is certainly less on the moon than on earth, about 1/6. Were the subject not restrained by the space suit, progression by jumps at 20 km/hr on the moon would cost no more than 10 ml/kg/min of oxygen, the same as walking on earth at 6 km/hr. The maximum height of a jump on both feet on the moon could attain 4 m in an unrestricted subject. (Author)

A73-42176 * # **Effects of weightlessness in man.** C. A. Berry (NASA, Office of Life Science Programs, Washington, D.C.). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972.
Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 187-199. 11 refs.

The program for the Apollo 16 flight was designed to include both safeguards against and investigations of the physiological problems arising from increase in the period of manned space flight. Precautions included the provision of a controlled diet with high potassium content, carefully controlled work loads and work-rest cycles, and an emergency cardiology consultation service, and investigations were made to enable preflight vs postflight comparisons of metabolic, cardiovascular, and central nervous system data. Results of these investigations indicate that adjustment to weightlessness can be satisfactorily assisted by appropriate countermeasures, including attention to diet. (Author)

A73-42177 # **Effects of chronic acceleration in animals.** A. H. Smith (California, University, Davis, Calif.). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 201-206. 28 refs.

Chronic acceleration describes the exposure of animals to increased acceleration fields of sufficient intensity and duration to induce physiological adaptation. By comparing the degree of changes observed in several fields with the acceleration intensity, it is possible to derive an estimate of the biological effect of gravity. For technical reasons, such studies are limited to artificial fields produced by protracted centrifugation. Observations by various investigators indicate a fairly general response to chronic acceleration. Over the size range presented by these species (0.04-5 kg), there appears to be a direct relationship between body mass and the degree of the acceleration-induced effect (tolerable field intensity, growth repression, inhibition of far deposition, etc.). However, different response patterns may obtain in homeotherms that differ significantly from this body size range. (Author)

A73-42178 # **Frequency of heavy ions in space and their biologically important characteristics.** S. B. Curtis (California, University, Berkeley, Calif.). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 209-214. 17 refs.

A review of the galactic cosmic ray energy spectra of heavy ions with Z not greater than 28 is presented. Fluxes of these ions within critical body organs of astronauts travelling outside the magnetosphere will be modified from the free space values by fragmentation within the spacecraft and the bodies of the astronauts themselves. The effects of such fragmentation are presented in terms of variations in the particle flux above a given dE/dx at representative depths. Present limitations to the accuracy of such calculations are considered. The validity of dE/dx as a relevant physical parameter for characterizing the biologically important component of the heavy ion radiation environment is discussed. (Author)

A73-42179 # **Solid state AgCl detectors for nuclear tracks with on- and off-response at choice - Applications to life sciences.** E. Schopper, G. Haase, F. Granzer, K. Dardat, G. Henig, J. U. Schott, F. Zörgiebel (Frankfurt, Universität, Frankfurt am Main; München, Universität, Munich, West Germany), H. Bücker, and G. Horneck (Frankfurt, Universität, Frankfurt am Main, West Germany). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. (A73-42158 22-04)
Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 215-223. 7 refs.

A73-42180 # **Estimation of the biological danger of the very high energy component of space radiation.** I. G. Akoev, S. S. Iurov, G. A. Leont'eva, I. A. Livanova, A. H. Achmadieva, B. S. Fomenko, V. N. Lebedev, and V. N. Lukanin (Akademiia Nauk SSSR, Moscow, USSR). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972.
Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 225-231. 19 refs.

In modelling the action of the high energy component of space radiation in a space ship, the secondary radiation resulting from the interaction of 76 GeV protons with a target was used. The radiation flow consisted of neutrons, mesons of different kinds and charges, protons, and gamma-quanta of wide energy spectrum. We studied the influence of radiation on the survival of E. coli B and T4Br+ bacteriophage; on the growth, dry weight and survival of Vicia faba; on the frequency of chromosome aberrations and number of cells with abnormal mitoses; on the rate of post-irradiation recovery according to these characteristics; and also on the yield of the r-mutants of T4Br+ bacteriophage, their distribution and biochemical identification. (Author)

A73-42181 # **Biological effects due to single accelerated heavy particles and the problems of nervous system exposure in space.** C. A. Tobias, T. F. Budinger, and J. T. Lyman (California, University, Berkeley, Calif.). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 233-245. 33 refs. AEC-supported research.

A73-42182 # **The radiobiological effects of heavy ions on mammalian cells and bacteria.** Iu. G. Grigor'ev, N. I. Ryzhov, E. A. Krasavin, S. V. Vorozhtsova, L. A. Koshcheeva, N. Ia. Savchenko, B. S. Fedorenko, V. F. Khlaponina, V. I. Popov, and E. I. Kudriashov. In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972.
Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 247-259. 9 refs.

A73-42183 # **Cellular effects of heavy charged particles.** P. Todd, C. B. Schroy (Pennsylvania State University, University Park, Pa.), W. Schimmerling, and K. G. Vosburgh (Princeton Particle Accelerator, Princeton, N.J.). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 261-270. 21 refs. Research supported by the Fannie E. Rippel Foundation and Princeton University.

The human cell is rendered reproductively inactive by the passage of a single heavy ion through its nucleus when the heavy ion deposits energy at a rate greater than about 3500 MeV/cm. This is demonstrated by the correlation of inactivation probability with nuclear area when cells having nuclei of different sizes are compared. This single-hit inactivation is irreversible and unmodifiable. The ion path length over which cells will be inactivated in this way is calculable from stopping power theory. Laboratory experiments in which three-dimensional human cell cultures were irradiated with high-energy nitrogen ions (3.9 GeV) at the Princeton Particle Accelerator confirm that cells are inactivated with maximum probability over the last 0.5 cm of the ion trajectory. This means that groups of adjacent cells in the ion path will be inactivated by a single ion with high probability. (Author)

A73-42184 # **Effects of heavy ions on bacteria.** H. Atlan (Rouen, Université, Rouen, France; Weizmann Institute of Science, Rehovot, Israel). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 273-280. 9 refs. Research supported by the Centre National d'Etudes Spatiales.

Genetically well-known bacteria have been used to study efficiencies of heavy ions for mutation induction. For space experiments a technique of correlation of tracks of particles (in emulsion stacked on and between Petri dishes) with individual mutations, has been designed and checked in balloon flights. No clear cut results could be obtained without previous identification of genetic markers sensitive to irradiation by heavy ions. Accelerator experiments were performed at the Berkeley HILAC for systematic study. The results obtained on a strain of E. coli K12F- requiring threonine, leucine and arginine showed that the cell inactivation kinetics for gamma rays, helium, carbon and oxygen ions were almost identical while argon was less effective. Heavy ions up to oxygen were either equally or less efficient than gamma rays for induction of reverse mutations. (Author)

A73-42185 # **The Biostack experiment on Apollo 16.** H. Bücker, G. Horneck, O. C. Allkofer, K. P. Bartholomä, R. Beaujean, P. Cüer, W. Enge, R. Facius, H. François, and E. H. Graul (Frankfurt, Universität, Frankfurt am Main, West Germany). In: Life sciences and space research XI; Proceedings of the Fifteenth Plenary Meeting, Madrid, Spain, May 10-24, 1972. Berlin, East Germany, Akademie-Verlag GmbH, 1973, p. 295-305.

The object of the Biostack experiment is to study the biological effects of high ZE particles of cosmic radiation in order to obtain information on the mechanism of these particles in biological matter. For this purpose individual local evaluation methods have been developed which allow one to identify each biologically effective particle and to correlate the individual hitting particle with the biological effect produced. The Biostack experimental package contains a series of monolayers of selected biological objects (Bacillus subtilis spores, Arabidopsis thaliana seeds, Vicia faba radiculae, Artemia salina eggs) with each layer sandwiched between several different cosmic ion track detectors (nuclear emulsions, cellulose nitrate, polycarbonate). By this arrangement a variety of biological effects due to a single penetrating particle can be analyzed. Influence on cellular and tissue development, nuclear damages, and mutation induction are the main investigated effects. (Author)

A73-42201 * **Nonthermal metabolic response of rats to He-O2, N2-O2, and Ar-O2 at 1 atm.** C. L. Schatte, J. P. Jordan, R. W. Phillips, D. P. Clarkson, and J. B. Simmons, II (Colorado State University, Fort Collins, Colo.). *American Journal of Physiology*, vol. 225, Sept. 1973, p. 553-558. 24 refs. Grant No. NGR-06-002-075.

Experiments were performed to describe qualitatively and quantitatively the nonthermal metabolic response of rats to normoxic mixtures of helium, nitrogen, or argon at 1 atm ambient pressure. Hypoxic mixtures were similarly tested to determine any differences in hypoxic response as a function of the diluent gas. Rats exposed to argon for 5 days had a reduced metabolic rate relative to nitrogen, as evidenced by oxygen and food consumption, CO2 production, and the catabolism of radiosubstrates. While some parameters indicated that helium increased metabolic rate, oxygen consumption did not significantly differ from that in nitrogen. The physiologic and metabolic response to an imposed hypoxia varied among the different environments. Certain indices suggested that the hypoxic effects were less severe in helium and more pronounced in argon than in nitrogen. The mechanisms by which the diluent gases produced the observed changes could not be identified, but some possibilities are discussed. (Author)

A73-42202 **Cerebral tolerance to asphyxial hypoxia in the dog.** D. Kerem and R. Elsner (California, University, La Jolla, Calif.). *American Journal of Physiology*, vol. 225, Sept. 1973, p. 593-600. 48 refs. Grant No. PHS-HE-08323.

The critical arterial and sagittal sinus blood during acute apneic asphyxia and hypoxic hypoxia in the curarized dog are determined, and their dependence on heart rate, blood carbon dioxide tension, and blood pH are examined. Evidence is presented for cerebral tolerance to hypoxia which is defined as a measurable period of partial cerebral anaerobiosis prior to appearance of the end point. M.V.E.

A73-42223 * **A model of the human in a cognitive prediction task.** W. B. Rouse (Tufts University, Medford, Mass.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-3, Sept. 1973, p. 473-477. 9 refs. Grant No. NGL-22-009-002.

The human decision maker's behavior when predicting future states of discrete linear dynamic systems driven by zero-mean Gaussian processes is modeled. The task is on a slow enough time scale that physiological constraints are insignificant compared with cognitive limitations. The model is basically a linear regression system identifier with a limited memory and noisy observations. Experimental data are presented and compared to the model. (Author)

A73-42319 # **Experimental studies on the production of pulmonary infarction. IV - Effects of UK, heparin, t-AMCHA or ellagic acid.** H. Hasegawa, N. Watanabe, N. Watanabe, H. Kakizaki, H. Murata, and M. Murao (Hokkaido University, Sapporo, Hokkaido, Japan). *Japanese Heart Journal*, vol. 14, July 1973, p. 335-349. 15 refs. Research supported by the Ageing Research Council.

A73-42341 **P wave analysis in 2464 orthogonal electrocardiograms from normal subjects and patients with atrial overload.** K. Ishikawa, P. M. Kini, and H. V. Pipberger (U.S. Veterans Administration Hospital, Birmingham, Ala., Dallas, Tex., Durham, N.C., Minneapolis, Minn., West Roxbury, Mass., Washington, D.C., Sepulveda and San Francisco, Calif.; George Washington University, Washington, D.C.). *Circulation*, vol. 48, Sept. 1973, p. 565-574. 35 refs. Grant No. NIH-HL-15047.

A73-42342 # **The correlation of coronary angiography and the electrocardiographic response to maximal treadmill testing in 76 asymptomatic men.** V. F. Froelicher, Jr., F. G. Yanowitz, A. J. Thompson, and M. C. Lancaster (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Circulation*, vol. 48, Sept. 1973, p. 597-604. 30 refs.

A73-42343 **The complications of coronary arteriography.** D. F. Adams, D. B. Fraser, and H. L. Abrams (Harvard University; Peter Bent Brigham Hospital, Boston, Mass.). *Circulation*, vol. 48, Sept. 1973, p. 609-618. 39 refs. Grants No. NIH-HL-11668; No. NIH-GM-18674; No. NIH-HL-05832.

Review of the results of a nationwide survey of the rate of complications due to coronary arteriography during 1970-1971. The results indicate that: (1) on the average, the risk of death, myocardial infarction, and cerebral embolus during or following coronary arteriography is greater with the transfemoral than with the transbrachial technique; (2) the risk of thrombosis at the site of catheter entry and contrast agent reaction during or following coronary arteriography is greater with the brachial technique; and (3) the risk of death or serious nonlethal complications is significantly enhanced in institutions performing a relatively small number of examinations by either technique. M.V.E.

A73-42372 **Signal/noise ratio in the recording of human nerve-action potentials.** P. Fitch (Institute of Neurology, London, England). *Medical and Biological Engineering*, vol. 11, Mar. 1973, p. 146-154. 12 refs.

After a discussion of the chief sources of random noise in amplifiers, and the limit they impose on amplifier sensitivity, some methods of reducing the apparent noise are introduced and their relative merits compared. The concept is introduced of reducing the

equivalent input noise voltage by summing the outouts of a number of preamplifiers which have their input terminals connected in parallel. A differential amplifier is described using field-effect transistors in the preamplifier stages, which exploits the parallel-input-stage principle. A description is then given of the recording of nerve action potentials from the median nerve, and comparative records are shown of action potentials after amplification by single- or multiple-input-stage versions of the amplifier described. (Author)

A73-42414 Absorption of gas bubbles in flowing blood. M. P. Hlastala and L. E. Farhi (New York, State University, Buffalo, N.Y.). *Journal of Applied Physiology,* vol. 35, Sept. 1973, p. 311-316. 18 refs. USAF-supported research; Contract No. N00014-68-A-0216. NR Project 101-722.

Resorption of N2 bubbles (radius 500 to 2500 microns) was measured in vitro in moving streams of saline, red cells suspended in saline, plasma, or whole blood. The absolute volume of the bubble was determined every 4 min by a compression technique. The diffusion characteristics are described in terms of the mass transfer coefficient, which decreased from 0.0059 to 0.0022 cm/sec as the viscosity of the perfusing liquid increased from 1 to 8 centistokes. The results are also interpreted in terms of generalized parameters which allow comparison of these results to those of other investigators using different systems. For a bubble in blood, the mass transfer characteristics are similar to heat and mass transfer from solid spheres to moving liquid. (Author)

A73-42415 Effects of hyperinflation of the thorax on the mechanics of breathing. A. E. Grassino, G. E. Lewinsohn, and J. M. Tyler (Harvard School of Public Health; Lemuel Shattuck Hospital, Boston, Mass.). *Journal of Applied Physiology,* vol. 35, Sept. 1973, p. 336-342. 21 refs. Grant No. NIH-HE-13843.

The effect of steady hyperinflation of the chest on ventilation and mechanics of breathing was studied in nine normal subjects breathing room air and 5% CO2. Hyperinflation was achieved by producing negative pressure around the body of subjects seated in a body box with the head out. Hyperinflation did not produce significant changes in tidal volume, frequency of breathing, or end-tidal CO2 while the subjects breathed room air. Breathing 5% CO2 produced a significant decrease in tidal volume in all subjects. (Author)

A73-42416 Work-heat tolerance derived from interval training. C. V. Gisolfi (Iowa, University, Iowa City, Iowa). *Journal of Applied Physiology,* vol. 35, Sept. 1973, p. 349-354. 22 refs. Research supported by the Iowa Heart Association; Grants No. NIH-FR-05372; No. NIH-FR-07035; Contract No. N00014-68-A-0196-0008.

An investigation was conducted to determine the maximal work-heat tolerance that physically fit ordinary young men can derive by participating in a physical training program in a cool environment. Attention was also given to the determination of the time of training required to achieve such tolerance. Six healthy, physically fit men at ages from 19 to 24 years were used in the study. It was found that the maximal work-heat tolerance which young men can derive from 11 weeks of physical training in a cool environment is variable and achieved at different rates. G.R.

A73-42417 Effects of increased external airway resistance during steady-state exercise. M. Demedts (Royal Victoria Hospital, Montreal, Canada) and N. R. Anthonisen (McGill University Clinic, Montreal, Canada). *Journal of Applied Physiology,* vol. 35, Sept. 1973, p. 361-366. 16 refs.

The application of a variety of resistive loads over the full range of steady-state exercise is discussed. Six normal male volunteers at ages from 19 to 37 years were studied. Exercise was carried out on an Elema bicycle. During exercise the subjects breathed through a large mouthpiece which was connected in series to a piezo ring for the measurement of mouth pressures, and a short length of tubing into which added resistances could be inserted. The resistances were evaluated in terms of added work of breathing. Expired gas was collected during the last minute of exercise and analyzed immediately for oxygen and carbon dioxide. G.R.

A73-42418 Climbing and cycling with additional weights on the extremities. E. Kamon, K. F. Metz, and K. B. Pandolf (Pittsburgh, University, Pittsburgh, Pa.). *Journal of Applied Physiology,* vol. 35, Sept. 1973, p. 367-370. 12 refs. U.S. Department of the Interior Grant No. G0122025; Contract No. N001467. Navy Task AD4020009.

Fourteen young adult males were employed in the investigation. Laddermill climbing was performed on a motor-driven ladder inclined 10 deg from the vertical. Climbing was executed with a foot-over-foot pattern. External loading of the subjects at the waist was accomplished with the use of a scuba diver's belt and lead weights adjusted to provide additional 5- or 10-kg loads. For the cycling test a Monark type cycle ergometer was used with the seat adjustable to the subject's height. The results of the tests are discussed, taking into account heart rates and the oxygen concentration in inspired and expired air samples. G.R.

A73-42419 Submaximal exercise with increased inspiratory resistance to breathing. V. Flook and G. R. Kelman (Marischal College, Aberdeen, Scotland). *Journal of Applied Physiology,* vol. 35, Sept. 1973, p. 379-384. 16 refs.

Eleven male subjects, 16 years of age, were used in the investigation. The inspiratory resistances used consisted of bundles of 7.5-cm glass tubes cemented into the bore of a large Perspex tube. The subjects were exercised on a Monark bicycle ergometer. Cardiorespiratory variables obtained during resistance breathing with light, moderate, and heavy exercise are listed in tables together with mean inspiratory and expiratory times and mean inspiratory flow rates. G.R.

A73-42420 Effect of altitude on renin-aldosterone system and metabolism of water and electrolytes. R. P. Hogan, III, T. A. Kotchen, A. E. Boyd, III, and L. H. Hartley (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.; U.S. Army, Walter Reed Army Institute of Research, Washington, D.C.). *Journal of Applied Physiology,* vol. 35, Sept. 1973, p. 385-390. 45 refs.

Ten healthy male volunteers between the ages of 19 and 23 years were studied in two groups of five each. The experimental period consisted of two control days at sea level, three days at 483 mm Hg ambient pressure simulating an altitude of 12,000 ft, and one or two recovery days following exposure to hypoxia. The subjects consumed a carefully measured diet. Venous blood was collected for the determination of recumbent plasma renin activity, hematocrit, and hemoglobin. Recumbent and standing plasma renin activity was found to be depressed at altitude. Aldosterone excretion decreased also at altitude. There was a direct correlation between the degree of depression of aldosterone excretion at altitude and the occurrence of symptoms of acute mountain sickness. G.R.

A73-42421 Gas transport in the human lung. M. Paiva (Bruxelles, Université Libre, Brussels, Belgium). *Journal of Applied Physiology,* vol. 35, Sept. 1973, p. 401-410. 32 refs. Research supported by the Conseil National de la Politique Scientifique.

The transport equation of gases in the bronchial tree is considered. The boundary conditions involved are discussed together with the solution of the transport equation. Attention is given to square flow, sinusoidal flow, the distribution of ventilation, and the respiratory frequency. The investigation illustrates the limitation of compartmental models for the study of gas transport in the human lung. This limitation results from the hypothesis subjacent to the compartmental analysis of an instantaneous homogenization in each compartment. G.R.

A73-42422 Influence of expiratory flow limitation on the pattern of lung emptying in normal man. R. E. Hyatt, G. C. Okeson, and J. R. Rodarte (Mayo Clinic and Mayo Foundation, Rochester,

Minn.). *Journal of Applied Physiology*, vol. 35, Sept. 1973, p. 411-419. 30 refs. Grant No. NIH-HL-12229.

The data presented confirm the observation that the volume at which a phase IV increase in expired nitrogen concentration occurs can vary, depending on the expiratory flow rate used and on the preceding flow history. When phase IV is flow-dependent, it may be related to the onset of dynamic compression in dependent airways. Eleven normal subjects were studied in the investigation. The results indicate that, in normal subjects exhaling at flows between 1.0 and 4.0 liters/sec, there is a change in the pattern of lung emptying at roughly the volume at which expiratory flow limitation occurs. G.R.

A73-42489 # **Integral topograms of heart potentials (Integral'nye topogrammy potentsialov serdtsa).** R. Z. Amirov. Moscow, Izdatel'stvo Nauka, 1973. 111 p. 72 refs. In Russian.

A study is made of those patterns of the cardiac electric field which make it possible to treat in a new manner the mechanism of formation of electrocardiograms and vectorcardiograms. On the basis of certain peculiarities noted in the dipole dynamics, a method of integral topography is proposed which combines the maximum values of the amplitude of the positive potentials at each point on the body surface into an electropositivity map and combines all the negative dipole charges into an electronegativity map. A description is given of the patterns of the dipole dynamics, and a classification is made of integral topograms. A.B.K.

A73-42500 **Optimal input rates for tilt adaptation.** S. M. Ebenholtz (Wisconsin, University, Madison, Wis.). *American Journal of Psychology*, vol. 86, Mar. 1973, p. 193-200. 13 refs. Grant No. PHS-MH-13006-06.

The effect of rate of change in optical tilt on adaptation was investigated by incrementing the level of tilt after every 5-min exposure period for a total of 25 min. The increments were 8, 10, and 12 deg in conditions 1, 2, and 3, respectively. In Experiment I the same subjects took part in all conditions; in Experiment II separate groups were used and the experiment was extended to include ten increments in tilt. In both experiments the rate of growth of adaptation varied inversely with the size of the increment. The results also suggest that higher levels of tilt require more time to process than lower levels and that increments in tilt may actually inhibit further processing when the change occurs too rapidly. (Author)

A73-42651 # **Estimate of integrative cerebral activity using an orientation response example (Otsenka integrativnoi deiatel'nosti mozga na primere orientirovochnoi reaktsii).** M. V. Serbinenko and E. S. Alimian. *Fiziologicheskii Zhurnal SSSR*, vol. 59, June 1973, p. 849-854. 8 refs. In Russian.

Analytical consideration of the interactions taking place among the various structures of the brain in the course of activities involving the whole organism. The cross-correlation method of EEG analysis is used inasmuch as it makes possible to determine the presence or absence of interrelations between processes simultaneously recorded at two selected points of the brain. M.V.E.

A73-42652 # **Effect of the electrical stimulation of the sensomotor cortex on the potentials of dorsal roots and on the depolarization of primary spinal afferents (Vliianie elektricheskoi stimuliatsii sensomotornoi kory na potentsialy zadnikh koreshkov i depoliarizatsiiu pervichnykh afferentov spinnogo mozga).** Iu. D. Ignatov (I Leningradskii Meditsinskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, June 1973, p. 861-869. 29 refs. In Russian.

A73-42653 # **Analysis of the changes in glial cell numbers in the auditory cortex during the application of acoustic stimuli of various intensities (Analiz izmenenii chisla glial'nykh kletok v slukhovoi oblasti kory golovnogo mozga pri primenenii zvukovykh stimulov razlichnoi intensivnosti).** M. M. Aleksandrovskaia and R. A. Chuzhenkova (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, June 1973, p. 870-874. 11 refs. In Russian.

A73-42654 # **Experimental substantiation of the optimal method for scaling the duration of acoustic stimuli (K eksperimental'nomu obosnovaniiu optimal'nogo metoda shkalirovaniia dlitel'nosti zvukovykh razdrazhenii).** V. I. Medvedev, N. D. Bagrova, and A. A. Sagal (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, June 1973, p. 898-903. 11 refs. In Russian.

Review of various fractionation, multiplication, and constant-stimulus-difference method combinations tested in selecting the optimal combination for estimating tonal sound durations ranging from 50 to 700 milliseconds in psychophysiological investigations of perception magnitude variation with stimulus magnitude. It is shown that the method of twofold or threefold multiplication combined with that of constant stimulus difference represents the optimal method combination. M.V.E.

A73-42655 # **Mechanism of 'readjustment' of aorta baroreceptors during hypertonia (K voprosu o mekhanizme 'perestroiki' baroretseptorov aorty pri gipertonii).** E. P. Aniukhovskii, N. T. Kovaleva, and F. P. Iasinovskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, June 1973, p. 916-923. 26 refs. In Russian.

Review of experiments performed upon isolated aortic arch specimens from rabbits with normal tension and renal hypertonia. The aortic baroreceptors were studied by recording the integrated activity of the aortic nerve and by simultaneously measuring the aorta. diameter. Threshold tension and threshold diameter were found to increase in the presence of hypertonia. The probable mechanism of readjustment of the baroreceptors is discussed. M.V.E.

A73-42656 # **Objective method for classification of multicellular activity patterns of neuron population in the cerebrum of man (Metod ob'ektivnoi klassifikatsii patternov mul'tikletochnoi aktivnosti neironnykh populiatsii golovnogo mozga cheloveka).** Iu. L. Gogolitsyn (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, June 1973, p. 960-962. 5 refs. In Russian.

A73-42657 # **Statistical treatment of evoked cerebral potentials during experiments on a Dnepr-1 computer (Statisticheskaia obrabotka vyzvannykh potentsialov mozga v khode eksperimenta s pomoshch'iu ZVM 'Dnepr-1').** G. V. Abuladze and N. N. Glushkov (Akademiia Nauk SSSR, Institut Fiziologii, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, June 1973, p. 963-965. In Russian.

A73-42658 # **Effect of chronic pyramid insufficiency on the function of spinal centers of shin and foot muscles in man (Vliianie khronicheskoi piramidnoi nedostatochnosti na funktsiiu spinal'nykh tsentrov myshts goleni i stopy u cheloveka).** A. Ia. Vernik and M. Kh. Starobinets (Petrozavodskii Gosudarstvennyi Universitet, Petrozavodsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, July 1973, p. 977-984. 25 refs. In Russian.

A73-42659 # **Reflex arch lability determination (Opredelenie labil'nosti reflektornoi dugi).** Iu. M. Ufland and M. F. Stoma (Leningradskii Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, July 1973, p. 1042-1047. 7 refs. In Russian.

Rhythmic stretching by longitudinal muscle vibration is substituted for the conventional electrical stimulation as a technique for determining the lability of the reflex arch while, simultaneously, an electromyogram is recorded. The maximum vibration frequency at

which the biocurrents and vibrations remain synchronous is used as the measure of lability. The results of the application of this method to rabbits are given. V.Z.

A73-42660 # **Urea content variations in blood and tissues during muscular activity in relation to the adaptation level of the organism (Izmeneniia soderzhaniia mocheviny v krovi i tkaniakh pri myshechnoi deiatel'nosti v zavisimosti ot adaptirovannosti organizma).** R. I. Lenkova, S. V. Usik, and N. N. Iakovlev (Leningradskii Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, July 1973, p. 1097-1101. 23 refs. In Russian.

A73-42661 # **Participation of the hypophysis and adrenal glands in intra-ocular pressure regulation (Uchastie gipofiza i nadpochechnikov v reguliatsii vnutriglaznogo davleniia).** N. V. Bekauri, M. I. Bazanova, L. I. Kolosova, and O. N. Fadeeva (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, July 1973, p. 1102-1107. 22 refs. In Russian.

Adrenalin, pituitrin or ACTH injections, and stimulation of certain areas of the hypothalamic region caused a persistent reduction of intra-ocular pressure, and also mydriasis, in rabbits. A physiological explanation of this action is given. V.Z.

A73-42662 # **Action of stable and pulsed noise on the processes of skeletal muscle excitation (Vliianie stabil'nogo i impul'snogo shuma na protsessy vozbuzhdeniia v skeletnykh myshtsakh).** V. V. Butukhanov (Leningradskii Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, July 1973, p. 1122-1125. 5 refs. In Russian.

Investigation of the action of stable and pulsed noise of 80, 90 and 100 dB on the background electromyograms of musculus biceps brachii, musculus triceps brachii, musculus tibiatis anterior and musculus gastrocnemius of adult rabbits with intact central nervous systems. The bioelectrical activity of these muscles was higher in experimental rabbits than in control rabbits. V.Z.

A73-42663 # **An assembly for electrophysiological and thermometric studies (Ustanovka dlia elektrofiziologicheskikh i termometricheskikh issledovanii).** B. I. Gekhman, V. I. Il'in, and G. B. Morozov (Akademiia Nauk SSSR, Institut Fiziologii; Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, July 1973, p. 1130-1133. 8 refs. In Russian.

Description of an assembly for simultaneous recording of neuron activity and thermal excitation of desirable areas of the body of a subject animal. A block diagram of the assembly and its circuits are included. The assembly has been in operation for one year and proved effective in providing running data in the course of prolonged experiments on thermoregulation in organism. V.Z.

A73-42664 # **Shaping device for frequency analysis of electrical processes in peripheral neural stems and ganglia (Formiruiushchee ustroistvo dlia chastotnogo analiza elektricheskikh protsessov v perifericheskikh nervnykh stvolakh i v gangliiakh).** O. S. Balbukov and A. D. Nozdrachev (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, July 1973, p. 1133-1136. 7 refs. In Russian.

A73-42665 # **A rapid method for determining the CO2 transport characteristics in man by using a capnograph and a multichannel respirator (Metodika bystrogo opredeleniia pokazatelei transporta CO2 u cheloveka s ispol'zovaniem kapnografa i mnogokanal'noi dykhatel'noi maski).** A. M. Shmeleva, I. S. Breslav, and B. N. Volkov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, July 1973, p. 1139-1143. 22 refs. In Russian.

A73-42666 **A multiplex cathode-ray-tube display with digital readout for a body plethysmograph.** J. A. Reynolds and C. B. McKerrow (Llandough Hospital, Penarth, Wales). *Medical and Biological Engineering,* vol. 11, May 1973, p. 268-274.

The cathode-ray-tube display of a body plethysmograph is enhanced by a composite switching circuit, which displays an electronically generated angle cursor and plethysmograph parameters simultaneously on an accurate single beam oscilloscope. A direct readout of the angle is obtained by means of a panel-mounted digital voltmeter together with facilities for operating a printer to provide permanent records. Additional circuits provide controllable antidrift voltages to the oscilloscope that counteract the drift of the plethysmograph and improve the stability of the display. (Author)

A73-42667 **The orbit and superior orbital fissure as an acoustic window.** G. R. Curry, R. J. Stevenson, and D. N. White (Queen's University, Kingston, Ontario, Canada). *Medical and Biological Engineering,* vol. 11, May 1973, p. 293-309. 15 refs. Research supported by the Medical Research Council of Canada.

The superior orbital fissure has been used as an acoustic window to image, by reflection techniques, the structures in the posterior part of the cranium above the tentorium cerebelli. The present study shows that to use this window it is essential that the beam should be accurately centered on both axes of the fissure, which acts as a diffraction slit. It was found that bones sufficiently thin to act as acoustic transparencies are frequently found in the margins of the orbit. When such a transparency is present in the greater wing of the sphenoidal bone, the acoustic window transmits more energy and has a larger aperture. Under these circumstances, and especially if the transparency is present on only one side, the images displayed from the two sides at the same receiver sensitivity may be sufficiently dissimilar to cause errors in diagnosis. Such errors may be of a false positive or false negative nature. (Author)

A73-42668 **An analogue-computer simulation of the facultative water-reabsorption process in the human kidney - A vascular role for a.d.h.** J. S. Packer and J. E. Packer (Melbourne, University, Melbourne, Australia). *Medical and Biological Engineering,* vol. 11, May 1973, p. 310-318. 19 refs.

This paper describes an analogue-computer simulation of the control of blood osmolality by means of water transfer from the distal tubule and collecting duct through the medulla to the vasa recta. The simulation, when subject to the separate tests of water ingestion and saline injection, produces realistic results when compared with the records of similar tests on humans and on experimental animals. To achieve the satisfactory overall performance from the simulation, it was necessary to include factors which are consistent with a dual role for a.d.h. in the model, the effect of a.d.h. is not only to change the permeability of the tubular epithelium, but also to alter the blood-flow rate and hydrostatic pressure in the vasa recta. (Author)

A73-42669 **A new method of measuring arterial dilation and its application.** A. Leblanc (Quebec, Université, Trois-Rivières, Quebec, Canada). *Medical and Biological Engineering,* vol. 11, May 1973, p. 326-335. 7 refs.

An instrument has been designed and constructed for the in-vivo measurement of instantaneous (phasic) diameter changes of arteries. The continuous record of this blood-vessel dimension, when recorded simultaneously with blood pressure, may be used to estimate the viscoelastic properties of the arterial wall. (Author)

A73-42670 **The specific resistance of blood at body temperature.** L. A. Geddes (Baylor University, Houston, Tex.) and C. Sadler (Rice University, Houston, Tex.). *Medical and Biological Engineering,* vol. 11, May 1973, p. 336-339. 10 refs. NSF Grant No. GK-35494; Grant No. NIH-TI-HE-05125.

The specific resistance of human, canine, bovine, and equine blood with a haematocrit range extending from 0 to 70% and at 37 C

was measured at 25 kHz. The data obtained were subjected to various curve-fitting procedures; in all cases, the resistivity was found to increase with increasing haematocrit. (Author)

A73-42671 **Computer acquisition of multiunit nerve-spike signals.** D. Stagg (Institute of Neurology; Imperial College of Science and Technology, London, England). *Medical and Biological Engineering,* vol. 11, May 1973, p. 340-347. 9 refs.

Two methods are described for the computer acquisition of multichannel, multiunit nerve-spike sequences. Both methods retain the spike peak-amplitude information, so that separation of the component single-unit populations can be carried out by the computer using this information. The first method uses analogue peak tracking to determine the spike amplitude, while in the second method the spike shape is reconstituted from the continuously sampled signal, and the peak amplitude is determined digitally. The performance and implementation requirements of the two systems are compared. (Author)

A73-42672 **Simple simulated human head for checking echoencephalographic equipment.** A. C. Hudson and J. L. Bradley (National Research Council, Radio and Electrical Engineering Div., Ottawa, Canada). *Medical and Biological Engineering,* vol. 11, May 1973, p. 359-361.

Description of a human-head dummy for testing and checking echoencephalographic equipment used in determining midline shifts in the human brain. The dummy is employed in the development of new types of echoencephalographic apparatus, but clinical users of commercial echoencephalographs could also use it for calibration of their equipment. M.V.E.

A73-42676 **Measuring characteristics of the displacement cardiograph.** T. R. Fenton and R. Vas (Strathclyde, University, Glasgow, Scotland). *Medical and Biological Engineering,* vol. 11, Sept. 1973, p. 552-559. 11 refs.

Description of the displacement cardiograph (DCG), a non-contacting electromagnetic transducer for measuring tissue movement. In normal operation, a sensing probe is placed near the moving tissue, and this produces an output voltage. The DCG detects movement by means of the electromagnetic field it generates. Its significance for the measurement of heart movements in the closed and open chest is discussed. M.V.E.

A73-42677 **A simple cardiac contractility computer.** Z. Winter and J. Fabian (Institute of Clinical and Experimental Medicine, Prague, Czechoslovakia). *Medical and Biological Engineering,* vol. 11, Sept. 1973, p. 560-568. 41 refs.

Description of the design and application of an analog computer for the simultaneous evaluation and monitoring of the myocardial contractile condition of patients at rest and during exercise. For the implementation of these functions, a proposed computer program can be easily set up and operated with any medium-size analog computer. M.V.E.

A73-42678 **Influence of nonideal flow conditions in haemodialysers on mass-transfer theories.** J. M. Kooijman (Centraal Laboratorium, C.M.C. Melkunie, Breukelen, Netherlands). *Medical and Biological Engineering,* vol. 11, Sept. 1973, p. 569-578. 7 refs. Research supported by the Gezondheidsorganisatie TNO.

The flow conditions in some commonly used haemodialysers have been investigated. For the blood compartment, it is found that considerable differences in height occur. This improves the mass transfer in a coil dialyser, but has a negative effect on the mass-transfer process in plate dialysers. In some designs, an effective mixing of the dialysate has been obtained, leading to a reduced mass-transfer resistance. (Author)

A73-42679 **Human phasic reflex response to parameters of a mechanical stimulus as an index of muscle-spindle sensitivity.** A. M. Clarke, P. T. Michie, and L. C. T. Glue (MacQuarie University, North Ryde, Australia). *Medical and Biological Engineering,* vol. 11, Sept. 1973, p. 597-602. 23 refs. Research supported by the MacQuarie University.

The relationship between three parameters of a tendon tap used as the stretch stimulus (peak force, rate of increase of force and total duration of the tap) and the phasic stretch reflex-measured by the muscle-action potential (m.a.p.), were examined statistically using a multiple regression analysis. It was found with relaxed, normal humans in a stimulus-attenuated environment that the peak force of the tap was the most significant parameter in determining the response. Under these conditions the primary ending of the muscle spindle appears to be more sensitive to the peak force applied to the tendon than the other two parameters measured. (Author)

A73-42680 **Relation between vibratory sensibility and electric signal of living body.** H. Ide and S. Obata (Aoyama Gakuin University, Tokyo, Japan). *Medical and Biological Engineering,* vol. 11, Sept. 1973, p. 603-608. 13 refs.

The paper presents psychological experiments carried out using a vibrometer as an acoustical calibration apparatus for triangular, sawtooth, square and pulse waves. The study has shown the relationship between the vibratory sensibility and the electric signal generated in a living body. The threshold curve for square waves is lower by 12.3 dB than that for sine waves at about 30 Hz. We consider that the evaluation of vibratory sensibility should be performed by a physical measurement, which also relates to subjective evaluation. It is necessary to find the new physical measurement. We have observed that subjective vibratory sensibility and potential variations take place linearly with the vibratory level. (Author)

A73-42681 **An inexpensive technique for analysis of aortic-nerve activity.** J. L. Matheny, D. Gray, and J. Lyon (Georgia, Medical College, Augusta, Ga.). *Medical and Biological Engineering,* vol. 11, Sept. 1973, p. 648-650. 6 refs.

An integrative method is presented by which whole nerve recordings from aortic baroreceptors can be analyzed. The uniqueness of this technique is shown to consist in its ease of operation, excellent result reproducibility, and design simplicity. M.V.E.

A73-42683 **On the electronic simulation of acceleratory nystagmus.** J. Santos, M. Pascual, and M. Valentinuzzi (Universidad Nacional del Sur, Bahia Blanca; Buenos Aires, Universidad, Buenos Aires, Argentina). *Letters in Applied and Engineering Sciences,* vol. 1, July 1973, p. 355-362. 12 refs.

The object of the paper is to propose an electronic model of the neural nets of the mesencephalic and pontine reticular formations involved in the generation of acceleratory nystagmus. Experimental electronystagmograms are first analyzed by quadratic regressions. The simulation system to produce a similar response is divided in three blocks; the first and the third blocks have been widely studied and fair analogies are possible. A model is proposed for the middleblock including facilitatory and inhibitory fascicular and a Lorente de Nó's closed chain to generate the oscillations. A reasonable good agreement was found between the real and the simulated nystagmograms. (Author)

A73-42685 **Structural conditions in the hypertrophied and failing heart.** H. M. Spotniz (Columbia Presbyterian Medical Center, New York, N.Y.) and E. H. Sonnenblick (Peter Bent Brigham Hospital; Harvard University, Boston, Mass.). *American Journal of Cardiology,* vol. 32, Sept. 20, 1973, p. 398-406. 41 refs. Grants No. NIH-HE-11306; No. NIH-HL-05890.

Hypertrophy represents a chronic adaptation of the myocardium to diastolic (volume) of systolic (pressure) loads. Resultant 'eccentric' and 'concentric' hypertrophy is discussed relative to ventricular compliance. The need for defined pressure-volume curves

with known ventricular mass and shape in human disease is stressed. Ultrastructural constraints to normal and abnormal function are noted in terms of the sarcomere, and the physiologic features of fiber orientation in the ventricular wall and their implications for normal function are denoted. In the absence of significant qualitative changes in structure in ventricular hypertrophy, the quantitative implications of these changes are noted. As yet, little is known of the fiber orientation and connective tissue skeleton of the heart in either severe hypertrophy or severe myocardial failure with dilatation.

(Author)

A73-42686 Abnormal biochemistry in myocardial failure. A. Schwartz, L. A. Sordahl, J. C. Allen, Y. S. Reddy, M. A. Goldstein, R. J. Luchi, L. E. Wyborny (Baylor College of Medicine; Methodist Hospital; U.S. Veterans Administration Hospital, Houston, Tex.), and M. L. Entman. *American Journal of Cardiology*, vol. 32, Sept. 20, 1973, p. 407-422. 91 refs. Research supported by the American Heart Association; Grants No. PHS-HL-05435; No. PHS-HL-07906; No. PHS-HL-05925; No. PHS-HL-13870; No. NIH-71-2493.

Some of the modern biological concepts of the normal and abnormal myocardium are reviewed. The reviewed concepts include those of the normal heart ultrastructure, the molecular nature of cardiac contraction, the myocardial ultrastructure in hypertrophy and failure, mitochondria in heart failure, and the sarcoplasmic reticulum relaxing system. Special attention is devoted to the contractile proteins in heart failure, namely, the troponin-tropomyosin system. M.V.E.

A73-42687 Ribonucleic acid /RNA/ polymerase and adenyl cyclase in cardiac hypertrophy and cardiomyopathy. K. G. Nair, T. Umali, and J. Potts (Pennsylvania, University, Hospital, Philadelphia, Pa.). *American Journal of Cardiology*, vol. 32, Sept. 20, 1973, p. 423-426. 30 refs. Research supported by the South Eastern Heart Association; Grant No. PHS-HE-08805-07.

The genetic regulatory mechanisms in cardiac hypertrophy and cardiomyopathy are discussed, with specific reference to nuclear and nucleolar RNA polymerase. A probable cause of cardiomyopathy in the Syrian golden hamster is suggested. The interrelation among catecholamines, adenyl cyclase, and RNA polymerase is briefly evaluated. M.V.E.

A73-42688 Myocardial oxygen consumption in experimental hypertrophy and congestive heart failure due to pressure overload. J. F. Gunning, G. Cooper, C. E. Harrison, and H. N. Coleman, III (Mayo Foundation, Rochester, Minn.; St. Vincent's Hospital, Sydney, Australia). *American Journal of Cardiology*, vol. 32, Sept. 20, 1973, p. 427-436. 36 refs.

Recent findings concerning the mechanics of contraction and oxygen consumption of the hypertrophied and failing myocardium are discussed. It is suggested that the mechanism for increased oxygen consumption under pressure-induced hypertrophy of the myocardium may lie in increased nonphosphorylating respiration by its mitochondria. M.V.E.

A73-42689 Nature and significance of alterations in myocardial compliance. J. W. Covell and J. Ross, Jr. (California, University, La Jolla, Calif.). *American Journal of Cardiology*, vol. 32, Sept. 20, 1973, p. 449-455. 58 refs. Grant No. NIH-HL-12373; Contract No. NIH-PH-43-NHLI-68-1332.

Recent knowledge of factors that acutely influence the distensibility of the myocardium in the intact heart and isolated cardiac muscle is discussed. Evidence for changes in myocardial compliance in disease states is reviewed. Special attention is given to stress-strain relations of the myocardium and, particularly, to active stiffness of the heart. M.V.E.

A73-42690 Alterations of cardiac sympathetic neurotransmitter activity in congestive heart failure. H. L. Rutenberg and J. F. Spann, Jr. (Temple University, Philadelphia, Pa.). *American Journal of Cardiology*, vol. 32, Sept. 20, 1973, p. 472-480. 49 refs.

Direct influences of the sympathetic nervous system on the normal and failing heart are reviewed. Evidence for parasympathetic-sympathetic system interactions, as they affect the heart, and alterations in the parasympathetic nervous system in heart failure are also discussed. M.V.E.

A73-42705 * Reaction time to changes in the tempo of acoustic pulse trains. R. P. Smith (Louisville, University, Louisville, Ky.), J. S. Warm (Cincinnati, University, Cincinnati, Ohio), and D. H. Westendorf (Vanderbilt University, Nashville, Tenn.). *Perceptual and Motor Skills*, vol. 36, Apr. 1973, p. 647-653. 13 refs. Contract No. DA-49-193-MD-2688; Grant No. NGL-36-004-014.

Investigation of the ability of human observers to detect accelerations and decelerations in the rate of presentation of pulsed stimuli, i.e., changes in the tempo of acoustic pulse trains. Response times to accelerations in tempo were faster than to decelerations. Overall speed of response was inversely related to the pulse repetition rate. M.V.E.

A73-42826 Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Symposium sponsored by Paavo Nurmi Foundation. Edited by P. Halonen and A. Louhija. Basel, S. Karger AG (Advances in Cardiology. Volume 8), 1973. 239 p. $21.85.

Apex cardiography, mechanisms of hyperlipidaemias in different clinical conditions, and polyparametric information of the electrocardiogram in injured tissue are among the topics covered in papers concerned with the early diagnosis of coronary heart disease. Other topics covered include indications and value of coronary arteriography, the prognostic significance of exercise ECG, and measurement of coronary blood flow by radiocardiography.

M.V.E.

A73-42827 The early diagnosis of coronary heart disease - Critical review. C. K. Friedberg (New York, City University, New York, N.Y.). In: Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Basel, S. Karger AG, 1973, p. 1-24. 53 refs.

Review of some of the crucial factors involved in the early diagnosis of coronary heart disease, and discussion of the merits of the various diagnostic techniques currently in use. The natural history of coronary atherosclerosis and that of coronary heart disease are described, and the value of early diagnosis is pointed out. Coronary arteriography and electrocardiograph stress tests are evaluated in terms of their effectiveness and hazards, as the invasive and noninvasive techniques currently available for preclinical diagnosis. Special attention is given to the early diagnosis of angina pectoris and sudden-death inducing acute myocardial infarction.

M.V.E.

A73-42828 Early diagnosis of coronary heart disease - What is it good for. G. Biorck (Serafimerlasarettet, Stockholm, Sweden). In: Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Basel, S. Karger AG, 1973, p. 25-37. 22 refs.

Discussion of the preventive value of early diagnosis of coronary heart disease. Following a review of the possibilities for an early diagnosis of coronary heart disease during different phases of the disease, and a survey of the distribution of male and female deaths from coronary disease by age groups and countries, it is pointed out that, in most cases, prevention of coronary heart disease means postponement of death (and possibly of symptoms), and that the main effect of successful prevention consists in saving people in their active years and some number of people beyond retirement age. Of

major importance to 'early diagnosis' is shown to be the screening of vast populations for genetic and environmental risk factors. M.V.E.

A73-42829 **Significance of arterial obstructive lesions in early diagnosis of coronary heart disease.** G. Baroldi (Milano, Università, Milan, Italy). In: Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Basel, S. Karger AG, 1973, p. 49-66. 43 refs.

A73-42830 **Indications and value of coronary arteriography.** F. M. Sones, Jr. (Cleveland Clinic Foundation, Cleveland, Ohio). In: Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Basel, S. Karger AG, 1973, p. 67-75. 8 refs.

The accomplishments over the last ten years of coronary arteriography are appraised and its indications and contraindications defined. Selective coronary arteriography is shown to have: (1) provided an objective basic standard of diagnosis not previously available; (2) determined the absence of coronary atherosclerosis in a large number of patients with chest pain; and (3) provided a basis for the development of surgical techniques for bypassing obstructions in proximal segments of major coronary arteries. M.V.E.

A73-42831 **The value of different angiographic procedures in coronary heart disease.** L. Björk (Akademiska Sjukhuset, Uppsala, Sweden). In: Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Basel, S. Karger AG, 1973, p. 76-84. 25 refs.

Various techniques of coronary angiography are appraised with respect to their value for the early diagnosis of coronary artery disease. It is shown that left ventricular angiocardiography is a most valuable diagnostic tool for patients with suspected coronary artery disease, but as a screening method for asymptomatic patients it is not recommended. M.V.E.

A73-42832 **Mechanisms of hyperlipidaemias in different clinical conditions.** T. A. Miettinen (Helsinki, University, Helsinki, Finland). In: Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Basel, S. Karger AG, 1973, p. 85-99. 37 refs.

Current concepts on the causes of hyperlipidaemias under different clinical conditions are reviewed. Special attention is given to the hypothesis, supported by evidence from several sources, that hypercholesterolaemia hardly develops as long as cholesterol elimination is normal, and that an elimination defect is in most cases responsible for increased serum cholesterol. M.V.E.

A73-42833 **Psychosocial factors and myocardial infarction - Why and how.** T. Theorell (Serafimerlasarettet, Stockholm, Sweden). In: Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Basel, S. Karger AG, 1973, p. 117-131. 19 refs.

Correlations of susceptibility to myocardial infarction with psychosocial factors are investigated as means for identifying susceptible persons. Psychosocial measurements are also considered as sources of help for determining periods in the lives of such persons when they are most susceptible to myocardial infarction. M.V.E.

A73-42834 **Polyparametric information of the electrocardiogram in injured tissue.** A. Bisteni, D. Sodi-Pallares, J. Ponce de León, and D. Ariza (Instituto Nacional de Cardiología, Mexico City, Mexico). In: Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Basel, S. Karger AG, 1973, p. 132-141.

Experimental data are presented that support the view that electrocardiograms provide important information regarding myocardial contraction, cell metabolism, electrolyte changes, etc., under normal and abnormal conditions. This is what is referred to as polyparametric electrocardiography. The existence of a close correlation is pointed out between the electrical and mechanical phenomena under both normal conditions and in the presence of injury following the occlusion of a coronary vessel in a dog's heart. M.V.E.

A73-42835 **Exercise ECG - Its prognostic significance.** I. Astrand (National Board of Occupational Safety and Health, Stockholm, Sweden). In: Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Basel, S. Karger AG, 1973, p. 142-147. 12 refs.

Review of studies dealing with the diagnostic and prognostic significance of various ECG changes recorded during and after subjection of patients to different work loads. Two of these studies show the specificity and sensitivity of ischemic heart disease prediction by means of exercise ECG to be about 70%, i.e., false positive and false negative test results amount to nearly 30%. M.V.E.

A73-42836 **Angina pectoris and ECG abnormalities in relation to prognosis of coronary heart disease in population studies in Finland.** S. Punsar (Institute of Occupational Health, Helsinki, Finland) and M. J. Karvonen (Laakso Hospital, Helsinki, Finland). In: Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Basel, S. Karger AG, 1973, p. 148-161. 24 refs. Research supported by the Yrjo Jahnsson Foundation and Paulo Foundation; Grants No. NIH-H-04754; No. NIH-H-04697.

A73-42837 **Emotions, catecholamines and coronary heart disease.** W. Somerville (Middlesex Hospital, London, England). In: Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Basel, S. Karger AG, 1973, p. 162-173. 20 refs.

Emotions stimulated by certain everyday events are discussed that can temporarily affect the performance of the cardiovascular system. Thus, healthy racing drivers, stimulated by the emotions of competition and danger, develop high-grade sinus tachycardia, raised plasma catecholamines, and free fatty acids immediately before and after a race. Public speaking has been observed to induce in normal persons similar changes in heart rate and rhythm and elevations in plasma catecholamines and free fatty acids. In both drivers and public speakers, triglycerides show a peak elevation 1-2 hrs after the event. Oxprenolol inhibits the increase in heart rate, plasma catecholamines, free fatty acids, and triglycerides. M.V.E.

A73-42838 **Measurement of coronary blood flow by radiocardiography - Study of 116 cases.** J. Di Matteo, A. Vacheron, C. Kellershohn, and P. de Vernejoul (Hôpital Necker, Paris; Service Hospitalier Frédéric Joliot, Orsay, Essonne, France). In: Early diagnosis of coronary heart disease; Proceedings of the Second Paavo Nurmi Symposium, Porvoo, Finland, September 9-11, 1971. Basel, S. Karger AG, 1973, p. 203-213. 14 refs.

A73-42856 **Coronary heart disease; Proceedings of the Second International Symposium, Frankfurt am Main, West Germany, June 1972.** Edited by M. Kaltenbach (Frankfurt, Universität, Frankfurt am Main, West Germany), P. Lichtlen (Medizinische Hochschule, Hanover, West Germany), and G. C. Friesinger (Vanderbilt University, Nashville, Tenn.). Stuttgart, Georg Thieme Verlag, 1973. 342 p. $28.30.

Knowledge about the mechanism of the action of the nitrites (e.g., amylnitrite) and nitrates (e.g., nitroglycerin, isosorbide dinitrate) by means of which these drugs exert their clinical benefit during an anginal attack is summarized. Coronary arteriography and ventriculography, the cause of coronary artery disease evaluated by coronary angiography, the left ventricle in coronary disease, measure-

ment of left ventricular volume, surgical treatment of left ventricular failure in coronary disease, and surgery of coronary arteries are considered. F.R.L.

A73-42859 **Special aspects of thermoregulation.** Edited by G. C. Whittow (Hawaii, University, Honolulu, Hawaii). New York, Academic Press, Inc. (Comparative Physiology of Thermoregulation. Volume 3), 1973. 287 p. $16.50.

'Primitive' mammals and aquatic mammals, are considered, as well as aspects of torpidity in mammals and the evolution of thermoregulation. Questions of thermoregulation in young mammals are discussed, giving attention to body size and thermoregulation, behavioral thermoregulation, physical thermoregulation, heat production, and the poikilothermic response of newborn mammals. G.R.

A73-42860 **'Primitive' mammals.** T. J. Dawson (New South Wales, University, Kensington, Australia). In: Special aspects of thermoregulation. New York, Academic Press, Inc., 1973, p. 1-46. 126 refs.

Details regarding the phylogeny of primitive mammals are examined. The evidence now indicates that mammals were derived from a cynodont ancestor, probably within the family Galesauridae in the late Triassic over 200 million years ago. Questions regarding the body temperature under nonstress conditions are investigated, giving attention to methodological considerations, monotremes, marsupials, primitive eutherians, and nychthemeral rhythms. The basal or standard metabolic rate is discussed together with the responses of primitive mammals to cold and thermoregulatory responses to heat. G.R.

A73-42861 **Aquatic mammals.** L. Irving (Alaska, University, Fairbanks, Alaska). In: Special aspects of thermoregulation. New York, Academic Press, Inc., 1973, p. 47-96. 84 refs. Grant No. NIH-GM-10402.

Aspects of the distribution of aquatic and diving mammals are discussed together with their number, size, and aquatic thermal conditions. Questions of the body temperature are explored, giving attention to variations with depth and location in the body and the variability of deep body temperature. Problems of metabolic heat production are considered together with details of insulation and the development of thermoregulation in infant aquatic mammals. Questions of the degree of adaptation of man to life in water are also examined, taking into account effects of experimental whole body immersion and man's performance in swimming and diving pursuits. G.R.

A73-42862 **Torpidity in mammals.** J. W. Hudson (Cornell University, Ithaca, N.Y.). In: Special aspects of thermoregulation. New York, Academic Press, Inc., 1973, p. 97-165. 276 refs. Grants No. PHS-GM-11368; No. PHS-GM-15889.

The use of 'torpidity' in the title rather than 'hibernation' is an attempt to cope with the problem of terminology. Questions of the evolution of hibernation are considered together with aspects of energy conservation, patterns of torpor, cellular and organ adaptations for low body temperatures, and the regulation of the cardiovascular system. The nervous system is examined, giving attention to the central nervous system, the peripheral nervous system, and aspects of behavior and hypothermia. The endocrine glands are discussed along with biochemical adaptations, questions of acclimation, endogenous and exogenous rhythms, sleep and hibernation, and physiological changes accompanying hibernation. G.R.

A73-42863 **Evolution of thermoregulation.** G. C. Whittow (Hawaii, University, Honolulu, Hawaii). In: Special aspects of thermoregulation. New York, Academic Press, Inc., 1973, p. 201-258. 188 refs. NSF Grant No. GB-29287X.

The effects of size, configuration, and composition on the temperature regulation of different animals are examined. Implications of variations in body temperature are considered together with the relation of body temperature to body size and state of hydration. Variations of body temperature in poikilotherms are discussed along with questions regarding the primitiveness of a low variable body temperature and the body temperature of birds. Other subjects investigated include heat production, heat loss, behavior, thermoregulatory control mechanisms, and the ontogeny of thermoregulation. G.R.

A73-42869 **Formation of visual images. Studies of stabilized retinal images /revised edition/.** V. P. Zinchenko and N. Iu. Vergiles. (Translation of Formirovanie zritel'nogo obraza. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969.) New York, Consultants Bureau, 1972. 63 p. 92 refs. $15.

A detailed investigation is made of the problem of image formation on the retina, hypothesizing not only a repeated change in the operative units of perception or image alphabet, but also a change in the alphabet of the motor components of perception. Methods of investigating the activity of the visual system under conditions of image stabilization, and under conditions of free viewing, are outlined. New data concerning perception under conditions of stabilization are presented. The manipulative ability of the visual system and the problem of image invariance are considered. A study is made of vicarious actions within the context of thought problems. A functional model of the sensory element of the visual system is developed. A.B.K.

A73-42926 # **Biodynamic applications regarding isolation of humans from shock and vibration.** J. B. Carmichael, Jr. and H. E. von Gierke (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). In: Isolation of mechanical vibration, impact, and noise; Proceedings of the Colloquium, Cincinnati, Ohio, September 9-12, 1973. New York, American Society of Mechanical Engineers, 1973, p. 246-270. 26 refs.

Review of mechanical shock and vibration exposure criteria and of biodynamic models representing man in order to establish a rational foundation for protection and isolation system designs applicable to both civilian and military exposure situations. A four-degree-of-freedom system incorporating the major body resonances is described which can be used not only to study the relationship between effects of vibration and shock, but the whole man/seat system including restraint and support. Two partially effective techniques for reducing the effect of buffeting on man are considered - namely, passive isolation and attenuation, and the use of restraint systems which reduce the relative displacement of the pilot with respect to the cockpit and minimize relative movement of body segments. A laboratory research model of an active hydraulic isolation system for compensation of the pilot's motion is described, as well as a simple mechanical model for predicting the probability of compression fracture of the vertical body segments during ejection from high-speed aircraft. A.B.K.

A73-42950 * **Cognitions and 'placebos' in behavioral research on ambient noise.** E. R. Harcum and P. M. Monti (College of William and Mary, Williamsburg, Va.). *Perceptual and Motor Skills*, vol. 37, Aug. 1973, p. 75-99. 49 refs. Contract No. NAS1-9461-2.

The study investigated effects of noise on visual and psychomotor tasks, with particular concern for influences of certain cognitive variables. A first experiment, using visual and card-sorting tasks, found no effects of 100 dB ambient noise per se, although cognitive variables in the testing situation affected both performance and ratings of disturbance. In two subsequent experiments some of the subjects were told that a noise was extraneous to their task of reproducing tachistoscopic patterns, and others were told that effects of the noise were being studied. It appears that in the absence of an adequate 'placebo' to control for cognitive factors, deceptive instructions may always be necessary in studies of ambient noise. F.R.L.

A73-42956 **Spatial integration in the crustacean visual system - Peripheral and central sources of non-linear summation.** R.

Glantz (Rice University, Houston, Tex.). *Vision Research*, vol. 13, Oct. 1973, p. 1801-1814. 26 refs. NSF Grant No. GB-33561.

A73-42957 **Eigenvectors of the sensitivity variations across the human central fovea.** R. M. Saunders (Imperial College of Science and Technology, London, England). *Vision Research*, vol. 13, Oct. 1973, p. 1823-1828. 5 refs.

A73-42958 **Investigation of complex and hypercomplex receptive fields of visual cortex of the cat as spatial frequency filters.** V. D. Glezer, V. A. Ivanov, and T. A. Shcherbach (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Vision Research*, vol. 13, Oct. 1973, p. 1875-1904. 34 refs.

A number of studies on the receptive fields (RF) in the visual cortex (VC, VCRF) of the cat are reviewed. The complex and hypercomplex VCRFs were investigated, and comparison of these fields with simple RFs and RFs of the corpus geniculatum lateralis was made over a set of parameters. The evidence thus obtained resulted in some new interpretations concerning both functional organization of VCRFs and their role in the processing of visual information. It is shown that complex and hypercomplex VCRFs cannot be considered as detectors extracting segments of a definite orientation. From investigation of impulse responses to stimuli consisting of several slits, it is concluded that VCRFs perform more complex types of processing information. The investigation suggests that VC performs the piecewise Fourier analyses of images. F.R.L.

A73-42959 **Recognition of component differences in two-dimensional oculomotor tracking tasks.** A. W. Goodwin and D. H. Fender (California Institute of Technology, Pasadena, Calif.). *Vision Research*, vol. 13, Oct. 1973, p. 1905-1913. 8 refs. Grants No. NIH-NB-03627; No. NIH-GM-01335.

Experiments are described which were designed to test whether or not the pattern recognition system and the tracking system operate only on a fixed set of coordinates set horizontally and vertically. The target motion axes were rotated in the plane, so that the sinusoidal motion occurred along an oblique line, neither vertical nor horizontal, and the random motion in the orthogonal direction. It was found that the oculomotor system identified the components correctly in their rotated positions and followed each with a delay appropriate to the class of target motion. However, if the oculomotor system was forced to track either the vertical component only of the combined motion, or the horizontal component only, then it failed to disentangle the two classes of motion embedded in each component. F.R.L.

A73-42960 **Stimulus specificity in the human visual system.** C. Blakemore, J. P. J. Muncey, and R. M. Ridley (Cambridge University, Cambridge, England). *Vision Research*, vol. 13, Oct. 1973, p. 1915-1931. 24 refs. Medical Research Council of England Grants No. G970/807/B; No. G972/463/B.

A high contrast grating seems gradually to fade during adaptation. A lower-contrast test grating appearing directly after the adapting pattern appears reduced in apparent contrast. The orientation specificity and spatial frequency specificity of this apparent contrast reduction were determined by adapting to gratings of various orientations and spatial frequencies, and by measuring the contrast reduction for test gratings of fixed orientation and frequency. The sensitivity characteristic for orientation has a half-width at half amplitude of 8 deg; that for spatial frequency has a full width at half amplitude of 0.75 octaves. This result is compared with the properties of neurones in the cat and monkey visual cortex. F.R.L.

A73-42961 **An evoked potential correlate of colour - Evoked potential findings and single-cell speculations.** D. Regan (Keele, University, Keele, Staffs., England). *Vision Research*, vol. 13, Oct. 1973, p. 1933-1941. 31 refs. Research supported by the Medical Research Council.

The aim of a number of evoked potential (EP) studies has been to identify electrophysiological correlates of stimulus wavelengths. Recent evidence suggests that it is necessary to specify the spatial structure of the stimulus in order to obtain an unequivocal answer to the question of whether electrophysiological correlates of stimulus wavelength exist that differ qualitatively from the electrophysiological correlates of stimulus intensity. An evoked potential correlate of stimulus wavelength is described which seems to be qualitatively different from correlates of stimulus intensity, since the effect of color cannot be mimicked by manipulating intensity. F.R.L.

A73-42962 **Recovery of cone receptor activity in the frog's isolated retina.** D. C. Hood and P. A. Hock (Columbia University, New York, N.Y.). *Vision Research*, vol. 13, Oct. 1973, p. 1943-1951. 25 refs. Research supported by Columbia University.

The study examines dark adaptation of the frog's cones by recording sodium aspartate isolated receptor potentials from the frog's isolated retina. The term 'isolated retina' is used to designate a retina freed from the pigment epithelium and removed from the eye. ERP recording (Goldstein, 1967, 1970) indicates that 80 to 90% of the cone pigment with a maximum wavelength at 580 nm (580 pigment) is regenerated in the frog's isolated retina. A measure of the dark-adapted sensitivity of the 580 cones is obtained, and it is shown that they recover nearly all their sensitivity following extensive light adaptation. F.R.L.

A73-42963 **Dark adaptation of the frog's rods.** D. C. Hood, P. A. Hock, and B. G. Grover (Columbia University, New York, N.Y.). *Vision Research*, vol. 13, Oct. 1973, p. 1953-1963. 31 refs. Research supported by Columbia University.

The study examines dark adaptation of the frog's red rods by recording Na aspartate isolated receptor potentials from the frog's isolated retina. Rod dark adaptation without pigment regeneration was measured and the permanent loss in rod sensitivity due to pigment bleaching was examined. Lights that bleach only a fraction of a percent of rod pigment substantially decrease the rod sensitivity immediately after the termination of the adapting light. However, the sensitivity quickly returns to the preadaptation level. With adaptation lights that bleach measurable amounts of pigment the rods recover their sensitivity more slowly and show a permanent loss in sensitivity. F.R.L.

A73-42964 **Signal and noise in the human oculomotor system.** G. J. St-Cyr (Cerberonics, Inc., Torrance, Calif.). *Vision Research*, vol. 13, Oct. 1973, p. 1979-1991. 18 refs. Grants No. NIH-NB-03627; No. NIH-GM-01335.

An attempt is made to separate signal from noise in the human oculomotor system during tracking tasks. Motions of the visual axes were recorded in both the vertical and horizontal directions for two subjects fixating a point target binocularly, and the power spectra of these eye movements were then computed. This was done for a stationary target and for targets moving randomly (at various speeds) in two dimensions. The power spectra were found to decrease with increasing frequency at the rate of about 27 dB/decade. This particular rate of attenuation indicates two possible hypotheses: either the spike trains along the extraocular muscles are the result of a very low bandwidth random process, or these efferent impulses are produced by a stochastic process whose power spectrum is essentially flat within the bandwidth of the oculomotor system. The relative merits of these two hypotheses are discussed. F.R.L.

A73-42973 # **Study of the nature of the active tonus with the aid of a discrete Wiener-medium analog (Doslidzhennia prirodi aktivnogo tonusu za dopomogoiu diskretnogo analoga seredovishcha Vinera).** P. G. Bogach and L. V. Reshod'ko (Kiivs'kii Derzhavnii Universitet, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seriia B - Geologiia, Geofizika, Khimiia i Biologiia*, vol. 35, May 1973, p. 442-446. 7 refs. In Ukrainian.

An automatic Wiener-medium analog was used as a device for studying the nature of the active tonus of muscles. Contraction curves of muscles were plotted, and a digital computer screen was used for the visualization of all cells of a muscle in the determination of the tonic and phase components of muscle contractions. Calculations showed that the tonus of a muscle depended on the excitation of muscle cells and on the ratio of the duration of cell excitation to that of cell refractivity. It is concluded that an active tonus is produced in muscles by asynchronous contractions of muscle cells. V.Z.

A73-42975 **Prevalence of hyperlipoproteinaemias in a random sample of men and in patients with ischaemic heart disease.** M. C. Stone and T. B. S. Dick (Leigh Infirmary, Leigh, Lancs., England). *British Heart Journal*, vol. 35, Sept. 1973, p. 954-961. 21 refs. Research supported by the Medical Research Council, Manchester Regional Hospital Board, and Imperial Chemical Industries, Ltd.

A73-43103 **Flow in branching vessels.** R. Brech and B. J. Bellhouse (Oxford University, Oxford, England). *Cardiovascular Research*, vol. 7, Sept. 1973, p. 593-600. 18 refs. Research supported by the Medical Research Council.

The flow in branching blood vessels is of importance to physiologists mainly on account of the formation of atheromatous deposits which occur frequently at sites of blood vessel branching. A detailed analysis of the flow in symmetrical branches was made, using rigid-walled models perfused with steady and pulsatile water flows. Parameters such as branch shape, Reynolds number, and Strouhal number were chosen so as to make the study applicable to a range of conditions on either side of typical blood flows. F.R.L.

A73-43104 **Velocity distribution in aortic flow.** C. Clark and D. L. Schultz (Oxford University, Oxford, England). *Cardiovascular Research*, vol. 7, Sept. 1973, p. 601-613. 21 refs. Research supported by the Medical Research Council.

Velocity measurements in the dog aorta using a thin film anemometer are described. The instantaneous velocity profiles for the ascending and descending aorta indicate a large inertial core region with relatively thin boundary layers; pronounced non-uniformities are present in the ascending aorta. Generally the flow was found to be free of turbulence with one notable exception; the possible origins of flow disturbances are discussed. (Author)

A73-43105 **Competition between collateral vessels.** R. L. Keenan and S. Rodbard (City of Hope Medical Center, Duarte, Calif.). *Cardiovascular Research*, vol. 7, Sept. 1973, p. 670-675. 10 refs. Grant No. NIH-RR-3.

Equations are established the solution of which indicates that an interactive system of two collateral vessels is unstable. It appears that, when the shear level on a sensitive endothelium is deviated from the critical level, processes are activated that tend to return the shear on each endothelial cell to its equilibrium value. A number of clinical and pathological findings are consistent with the thesis that hydrodynamic drag may determine the caliber of vessels. F.R.L.

A73-43106 **Blood groups and plasma cholesterol esterification.** E. J. Wakley and M. J. S. Langman (General Hospital, Nottingham, England). *Cardiovascular Research*, vol. 7, Sept. 1973, p. 676-678. 11 refs. Research supported by the Medical Research Council.

A73-43107 **Blood group A sub-groups and serum cholesterol.** E. J. Wakley, M. J. S. Langman, and P. C. Elwood (General Hospital, Nottingham, England). *Cardiovascular Research*, vol. 7, Sept. 1973, p. 679-683. 25 refs. Research supported by the Medical Research Council.

A73-43108 **Transcutaneous measurement of blood velocity profiles and flow.** M. B. Histand (Colorado State University, Fort Collins, Colo.), C. W. Miller (Zürich, Universität, Zurich, Switzerland), and F. D. McLeod, Jr. (Eidgenössische Technische Hochschule, Zurich, Switzerland). *Cardiovascular Research*, vol. 7, Sept. 1973, p. 703-712. 18 refs. Grant No. PHS-HE-14737; Contract No. PHS-CPE-R-70-0001.

A comprehensive report is presented of the application of a pulsed ultrasound Doppler velocity meter for transcutaneous measurement of time varying velocity, velocity profiles, and instantaneous flow in arteries of anaesthetized dogs. The procedure used to provide direct velocity and flow calibration using the Doppler equation is outlined. Typical transcutaneous recordings obtained from the femoral artery, abdominal aorta, and carotid artery are illustrated. The results compare favorably with data obtained by invasive means such as electromagnetic cuff flowmeters. The possibility of high resolution, non-invasive haemodynamic measurements on dogs is demonstrated and the application to conscious human subjects suggested. (Author)

A73-43109 **An ultrasonic displacement instrument with greater beam dispersal.** G. A. McGough, D. Breazeale, G. L. Mullins, and W. G. Guntheroth (Washington, University, Seattle, Wash.). *Cardiovascular Research*, vol. 7, Sept. 1973, p. 713-718. 7 refs. Grants No. PHS-HE-03998; No. PHS-HE-13517.

An ultrasonic transit time device was modified to permit close placement of the crystals and to broaden the effective spatial angle of the beam of ultrasound. The device is ideal for chronic animal experiments since its output is linear for displacement and calibration may be performed at any time. (Author)

A73-43110 # **Development of pilot-in-the-loop analysis.** D. McRuer (Systems Technology, Inc., Hawthorne, Calif.). *(American Institute of Aeronautics and Astronautics, Guidance and Control Conference, Stanford, Calif., Aug. 14-16, 1972, Paper 72-898.) Journal of Aircraft*, vol. 10, Sept. 1973, p. 515-524. 46 refs.

The pilot's dynamic characteristics when operating as a controller are affected by several physical, psychological, physiological, and experimental variables. The most important class of situations in closed-loop control of aircraft are compensatory tasks in which the pilot acts on displayed error quantities between desired command inputs and comparable vehicle output motions to produce control actions. Human pilot behavior; fundamental concepts in pilot-vehicle analysis; development chronology of pilot-in-the-loop analysis; a single-loop, full-attention tracking model; pilot rating, workload, and pilot dynamics for single-loop situations; and a multiloop pilot model for tracking situations are discussed. F.R.L.

A73-43129 **Clinical aviation psychology (Klinische Flugpsychologie).** K. Gerbert (Bundesministerium der Verteidigung, Luftwaffe, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany). *Wehrmedizinische Monatsschrift*, vol. 17, Sept. 1973, p. 258-262. 6 refs. In German.

Introduction to the scope and methods of 'clinical psychology' at the West German Air Force Institute for Aviation Medicine. The striking mental and psychosomatic aspects of cases examined by the aviation psychology team which occurred most frequently during investigations for fitness for military flying are briefly outlined, and the necessity for complementary consideration and treatment of psychophysical disturbances of airmen is emphasized, certain prospective duties being assigned to the aviation doctor in the unit. (Author)

A73-43130 **Flying stress - A measurable quantity (Flugstress, ein messbare Grösse).** W. Hoffelt (Bundesministerium der Verteidigung, Luftwaffe, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany). *Wehrmedizinische Monatsschrift*, vol. 17, Sept. 1973, p. 263-266. In German.

Discussion of the possibilities and limitations of quantifying inflight strains. Methodological difficulties encumbering the measure-

ment of psychophysiological reactions to flying stress are pointed out. It is concluded that in the present state of research psychological interview and evaluation techniques are more apt than psychophysiological methods to provide fairly useful information about inflight strains. (Author)

A73-43131 **Radiological assessment of the vertebral column from the point of view of aviation medicine (Radiologische Beurteilung der Wirbelsäule aus fliegerärztlicher Sicht).** A. Beck (Bundesministerium der Verteidigung, Luftwaffe, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany). *Wehrmedizinische Monatsschrift,* vol. 17, Sept. 1973, p. 267-276. 20 refs. In German.

Study of the specific alterations of the vertebral column caused by flying, noting the very differing opinions on their importance for flight personal. The complexes of Scheuermann's disease, scoliosis, the variations and deformities, spondylolisthesis, lesions of the vertebral disks, and sequelae of fractures are treated. The differences in opinions prevalent in the various national Air Forces become clearly evident in comparative tables presenting the different clinical pictures and anomalies. (Author)

A73-43132 **The frequency of barotraumas as determined by nasal findings and X-rays of the paranasal sinuses (Die Häufigkeit von Barotraumen in Abhängigkeit von Nasenbefund und Röntgenbefund der Nasennebenhöhlen).** G. Fröhlich (Bundesministerium der Verteidigung, Luftwaffe, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany). *Wehrmedizinische Monatsschrift,* vol. 17, Sept. 1973, p. 277-280. 7 refs. In German.

Results of a study in which 476 pilot candidates were subjected to oxygen deficiency stress in an altitude chamber, after a thorough ENT speculum examination with X rays of the paranasal sinuses had been made the preceding day. The relationships between the barotraumas experienced and the nasal and X-ray findings were investigated. Several typical X-ray findings are demonstrated after barosinusitis. (Author)

A73-43133 **Eye function and the illumination of instrument dials in aircraft (Augenfunktion und die Beleuchtung der Instrumentenanzeigen im Flugzeug).** D. Kürschner (Bundesministerium der Verteidigung, Luftwaffe, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany). *Wehrmedizinische Monatsschrift,* vol. 17, Sept. 1973, p. 281-283. 12 refs. In German.

The manner of mounting and the color of the light used for the illumination of instrument dials in the cockpit are of importance for flight safety. For modern high-performance jet aircraft, indirect white individual illumination of the instrument dial is the illumination of choice. Red light, which maintains the dark adaptation of the eyes, is only necessary in special situations. For this purpose, a red floodlight can be used as additional illumination. (Author)

STAR ENTRIES

N73-30060*# Scripta Technica, Inc., Washington, D.C.
MOLECULAR MECHANISMS OF ADAPTATION TO HYPOXIA
F. Z. Meyerson NASA Aug. 1973 24 p refs Transl. into ENGLISH from Priroda (Moscow), no. 6, 1972 p 74-81
(Contract NASw-2484)
(NASA-TT-F-15058) Avail: NTIS HC $3.25 CSCL 06S

A discussion is presented on the possible mechanism of adaptation to hypoxia and the role of the respiratory enzymes ATP, RNA, and DNA in adaptation. Data are also given on inhibition of RNA synthesis as a counter adaptive factor indicating RNA's essential role in adaptation. Author

N73-30061# Japan Broadcasting Corp., Tokyo. Technical Research Labs.
NHK TECHNICAL MONOGRAPH NO. 21
Mar. 1973 33 p refs
Avail: NTIS HC $3.75

Results are presented of research activities covering the field of radio and television broadcasting engineering and areas of funamental research which may contribute to the future of broadcasting engineering. Described are investigations conducted into: (1) control mechanism of the accommodation-vergence eye movement system in human eyes; and (2) importance of central and peripheral vision in pattern perception and recognition.

N73-30062 Japan Broadcasting Corp., Tokyo.
CONTROL MECHANISM OF THE ACCOMMODATION-VERGENCE EYE-MOVEMENT SYSTEM IN HUMAN EYES
Tatsuo Yoshida and Akira Watanabe *In its* NHK Tech. Monograph Mar. 1973 p 3-20 refs

Each of the two systems of accommodation and vergence eye movement in human eyes is regarded as a servo system when they track a moving target. These systems are closely connected to each other. The control mechanism of this connected system was analyzed by measurement of its input-output relations using control system identification techniques. Using opto-electronic measuring apparatus, the indicial response and frequency response of the system were measured objectively. Two kinds of target systems were used for measurement, one of them a target which moved back and forth and the other displayed on a stereoscope, apparently moving back and forth. A fundamental linear model was constructed to explain the measured characteristics. Statistical characteristics of fluctuations in the responses of the system were analyzed and a model of their generating mechanism was discussed. Author

N73-30063 Japan Broadcasting Corp., Tokyo.
ROLES OF CENTRAL AND PERIPHERAL VISION IN PATTERN PERCEPTION
Akira Watanabe and Tatsuo Yoshida *In its* NHK Tech. Monograph Mar. 1973 p 23-31 refs

An experiment of pattern perception was conducted under the condition that the patterns could be observed with central vision alone by using a TV system combined with an optical device of fixation point detector. The pattern was hidden and its height was 15 deg - 17 deg in subtended visual angle. A subject could make observations by sampling any part of a limited circular area from the hidden pattern, of which diameter was about 3 deg centered on the line of sight. Under such a condition, it was confirmed to be difficult for the subject to perceive person's faces, patterns formed by dotted lines, or even simple and familiar Japanese letters. The result seems to be suggesting that human beings are surprisingly inferior in the ability to build up the image of the whole in the psychological space by successively sampling parts of a pattern. The result also indicates that the peripheral vision plays an important role in the extraction of interrelationship between pattern constituents or of features based on the law of configuration as mentioned in Gestalt psychology. Author

N73-30064*# Public Health Service, Phoenix, Ariz. Environmental Microbiology Section.
SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION Technical Report, Apr. - Jun. 1973
Martin S. Favero Jun. 1973 9 p
(NASA Order W-13062)
(NASA-CR-133742; Rept-42) Avail: NTIS HC $3.00 CSCL 06M

The project to evaluate thermal sterilization for unmanned landers is reported. A temperature controlled oven with a nitrogen gas supply containing a known concentration of water is discussed. The studies show that bacillus lentus, bacillus brevis, bacillus coagulans, atypical bacillus spp., and actinomycete are isolated heat survivors. The thermal resistance is given for naturally occurring airborne bacterial spores collected on exposed teflon ribbons. T.M.R.

N73-30065*# Techtran Corp., Silver Spring, Md.
PROBLEMS OF SPACE BIOLOGY, VOLUME 21: TISSUE OXYGEN UNDER EXTREME FLIGHT FACTORS
Ye. A. Kovalenko and I. N. Chernyakov Washington NASA Aug. 1973 264 p refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii, Tom 21, Kislorod Tkaney pri Ekstemal'nykh Faktorakh Poleta" Moscow, Nauka Press, 1972 264 p
(Contract NASw-2037)
(NASA-TT-F-762) Avail: NTIS HC $6.35 CSCL 06P

The oxygen pressure is observed as it changes in the brain and other important areas of the organism at various altitudes, and when breathing various gas mixtures. The effect of different atmospheric compositions on oxygen pressure in the several tissues under discussion is shown in specific examples on laboratory animals. Prophylaxes of hypoxia, hyperoxia, hyper- and hypocapnia is discussed and ways of accomplishing this through the use of atmospheric component variation are shown. Extreme cases are duplicated, using animals, and detailed tissue oxygen findings are given. Recommendations are made for specific cases in spaceflight and other conditions for creating artificial atmospheres. Author

N73-30066# MAN-Acoustics and Noise, Inc., Seattle, Wash.
THE EFFECT OF SIMULATED SONIC BOOM RISE TIME AND OVERPRESSURE ON ELECTROENCEPHALOGRAPHIC WAVEFORMS AND DISTURBANCE JUDGMENTS Final Report
J. E. Mabry and H. J. Parry Jul. 1973 39 p refs
(Contract DOT-FA73WA-3213)
(FAA-RD-73-115) Avail: NTIS HC $4.00

The 3 main objectives of this study were to: (1) determine the feasibility of investigating the effect of simulated sonic booms, on some sleep patterns of persons undergoing routine electro-encephalographic (EEG) examinations, (2) determine the extent that EEG waveforms are altered by the simulated sonic booms, and (3) obtain disturbance judgments as a function of the simulated boom noises. Results were obtained from fifty (50) subjects of both sexes with ages ranging from 15 to 72 years of age. Data was relevant to resting, dozing, or light sleep. The EEG waveforms for resting or dozing persons were not changed by the simulated

boom noises. In general, the subjects were not disturbed by the simulated booms. Ninety-two (92) percent of the subjects reported no disturbance to any of the simulated booms presented. Two rise times of 15 and 7 ms were employed with overpressures ranging from 0.94 to 2.85 PSF. Author

N73-30067*# Scientific Translation Service, Santa Barbara, Calif.
THE OXIDES OF MANGANESE: THEIR COMPARATIVE TOXICITY AND HYGIENIC IMPORTANCE AND THE CLINICAL MEDICINE OF CHRONIC MANGANESE EXPOSURE
N. V. Lazarev, (ed.) and E. N. Levina, (ed.) Washington NASA 4 Sep. 1973 236 p refs Transl. into ENGLISH from State publishing House for Med. lit. (Leningrad), 1962 176 p
(Contract NASw-2483)
(NASA-TT-F-15000) Avail: NTIS HC $14.00 CSCL 06T

The question as to the toxicity differences between the four oxides containing manganese in the form of the bi-, tri-, and quadrivalent metal is discussed. Pathoanatomical and pathohistological changes in certain internal organs and the endocrine glands in intoxication by various manganese oxides are also considered. Author

N73-30068*# Techtran Corp., Silver Spring, Md.
THE AMMONIFYING ABILITY OF THE DENITRIFYING BACTERIA OF THE SPECIES PSEUDOMONAS FLUORESCENS
Yu. V. Kruglov Washington NASA Sep. 1973 9 p refs Transl. into ENGLISH from Tr. Vses. Nauch. Issld. Inst. Selskokhoz. Mikrobiol. (Moscow), v. 15, 1958 p 121-127
(Contract NASw-2485)
(NASA-TT-F-15086) Avail: NTIS HC $3.00 CSCL 06M

The ammonifying activity of denitrifiers and their role in plant nutrition is discussed. Experiments cited show that the bacteria species employed as a denitrifier can indeed be an ammonifier when peptone is used as a source of nitrogen and carbon nutrition. Author

N73-30069*# Ohio State Univ. Research Foundation, Columbus. Dept. of Aeronautical and Astronautical Engineering.
FLUID DYNAMIC ASPECTS OF CARDIOVASCULAR BEHAVIOR DURING LOW-FREQUENCY WHOLE-BODY VIBRATION Final Report, 1 Nov. 1968 - 31 Oct. 1972
Robert M. Nerem Apr. 1973 25 p refs
(Grant NGL-36-008-117; RF Proj. 2732)
(NASA-CR-133843; Rept-15) Avail: NTIS HC $3.25 CSCL 06P

The behavior of the cardiovascular system during low frequency whole-body vibration, such as encountered by astronauts during launch and reentry, is examined from a fluid mechanical viewpoint. The vibration characteristics of typical manned spacecraft and other vibration environments are discussed, and existing results from in vivo studies of the hemodynamic aspects of this problem are reviewed. Recent theoretical solutions to related fluid mechanical problems are then used in the interpretation of these results and in discussing areas of future work. The results are included of studies of the effects of vibration on the work done by the heart and on pulsatile flow in blood vessels. It is shown that important changes in pulse velocity, the instantaneous velocity profile, mass flow rate, and wall shear stress may occur in a pulsatile flow due to the presence of vibration. The significance of this in terms of changes in peripheral vascular resistance and possible damage to the endothelium of blood vessels is discussed. Author

N73-30070# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
EFFECTS OF TIME SHIFT ON DIURNAL RHYTHMS OF 17-HYDROXY CORTICOSTEROIDE Ph.D. Thesis - Bonn Univ. [AUSWIRKUNGEN DER ZEITVERSCHIEBUNG AUF DIE TAGESRHYTHMIK DER 17-HYDROXYCORTICOSTEROIDE]
Udo Dierlich 20 Mar. 1973 68 p refs In GERMAN; ENGLISH summary
(DLR-FB-73-58) Avail: NTIS HC $5.50; DFVLR, Porz, West Ger. 20,60 DM

The urinary excretion of conjugated and unconjugated 17-hydroxycorticosteroids (17-OHCS) was studied in 8 male students at 3 hour intervals during periods of 24 hours. Two 24 hour preflight periods revealed basic normal daily periodicity of 17-OHCS excretion. Effects of a 6 hour time shift were evaluated by determining the excretion rates after flight from Germany to the USA and vice versa on days 1, 3, 5, and 8 after arrival. A desynchronization with the local time was observed after flights in both directions, the diurnal 17-OHCS excretion patterns being more disturbed, however, after the West-East flight. The resynchronization time of maximum and mininum excretion was 3 to 5 days after the westward travel and 5 to 8 or more after traveling in the opposite direction. It is suggested that the unfavorable flight conditions of the West-East flight (night flight) mainly account for the more marked time shift effects observed after the eastward flight. Author

N73-30071# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
CONTRIBUTION OF THE ANTICIPATION STRESS TO TOTAL FLIGHT STRESS AND ITS DEPENDENCE ON DIURNAL RHYTHM, MEASURED BY PHYSIOLOGICAL PARAMETERS Ph.D. Thesis - Bonn Univ. [DER ANTEIL DER ERWARTUNGSSPANNUNG AN DER FLIEGERISCHEN GESAMTBELASTUNG UND IHRE ABHAENGIGKEIT VOM TAGESRHYTHMUS, GEMESSEN AN PHYSIOLOGISCHEN GROESSEN]
Peter Kroll 27 Jun. 1972 69 p refs In GERMAN; ENGLISH summary
(DLR-FB-72-39) Avail: NTIS HC $5.50; DFVLR, Porz, West Ger. 18 DM

The rating of anticipation reaction before flight was compared with flight stress. An evaluation was also made of whether the anticipation reaction depends on daytime oscillation and whether it differs from the diurnal pattern of flight stress. Eighteen pilots had to perform a standardized instrument flight in a flight simulator in order to determine pulse rate, ventilation rate, respiratory minute volume, oxygen uptake, and carbon dioxide output before and during a given flight task. The result showed that anticipation reaction coincides with flight stress. Author (ESRO)

N73-30072# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
BEHAVIOR OF CELL ENZYMES, GLUCOSE, CHOLESTEROL AND 17-HYDROXYCORTICOSTEROIDS IN BLOOD DURING PHYSICAL EXERCISE AND AS A FUNCTION OF TRAINING CONDITION Ph.D. Thesis - Bonn Univ. [DAS VERHALTEN VON ZELLENZYMEN, GLUCOSE, CHOLESTERIN UND 17-HYDROXY-CORTICOSTEROIDEN IM BLUT UNTER KOERPERLICHER ARBEIT IN ABHAENGIGKEIT VOM TRAININGSZUSTAND]
Gerd Brockkoetter 17 Jul. 1972 55 p refs In GERMAN; ENGLISH summary
(DLR-FB-72-48) Avail: NTIS HC $4.75; DFVLR, Porz, West Ger. 14,70 DM

In 11 untrained and 11 highly trained subjects the alterations of cell enzymes, glucose, cholesterol and 17-OH-corticosteroids were studied in response to physical exercise and in relation to physical condition. The training status was quantified by measuring maximum oxygen uptake. The two groups of subjects showed differences in their responses to physical exercise with respect to aldolase, glucose and 17-OH-corticosteroids. There was no evidence for a close relationship between the status of physical fitness and the extent of the observed alterations; however, a significant coefficient ($r = 0,628$) was found for the correlation between the maximum oxygen uptake and the resting values of plasma aldolase. Author (ESRO)

N73-30073# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.

CIRCADIAN RHYTHM VARIATIONS OF CIRCULATION RESPRIRATION, AND CATABOLISM UNDER FLIGHT STRESS CONDITIONS Ph.D. Thesis - Bonn Univ. [TAGESRHYTHMISCHE SCHWANKUNGEN VON KREISLAUF, ATMUNG UND GASSTOFFWECHSEL UNTER FLIEGERISCHER BELASTUNG]

Wolf-Dieter Steinhoff 26 Jul. 1972 59 p refs In GERMAN; ENGLISH summary

(DLR-FB-72-49) Avail: NTIS HC $5.00; DFVLR, Porz, West Ger. 15,90 DM

In order to determine the circadian rhythms of physiological standards under the stress of flying, the pulse rate, frequency of respiration, O2 inspiration and CO2 expiration were investigated in a flight simulator with 17 airforce pilots. The results showed an exact circadian rhythm with gradual ascent of the physiological activity during the morning hours until a maximum during the early morning. The nightly trough in performance, which is proven once more should be seriously considered in flight schedules of military and civilian aviation. Author (ESRO)

N73-30074# Indian National Scientific Documentation Centre, New Delhi.

SCIENTIFIC CREATIVITY, PART 1

1972 282 p refs Transl. into ENGLISH from the publ. "Nauchnoe Tvorchestvo" Moscow, Nauka, 1969 p 1-277 Sponsored by NSF 3 Vol.

(TT-70-57147-1) Avail: NTIS HC $3.00 CSCL 05K

Papers and lectures compiled at the 1967 U.S.S.R. symposium on the psychology of scientific and technical creativity are reported. The theory of scientific discovery as an essential part of the general theory of science, and discussions on general problems are included. Articles on methodology and historical problems; presentations covering psychological models, cybernetics, methodology, and applications to teaching are reviewed. T.M.R.

N73-30075# Indian National Scientific Documentation Centre, New Delhi.

SCIENTIFIC CREATIVITY, PART 2

1972 300 p refs Transl. into ENGLISH from the publ. "Nauchnoe Tvorchestvo" Moscow, Nauka, 1969 p 278-576 Sponsored by NSF 3 Vol.

(TT-70-57147-2) Avail: NTIS HC $3.00 CSCL 05K

Papers and lectures compiled at the 1967 U.S.S.R. symposium on the psychology of scientific and technical creativity are reported. The theory of scientific discovery as an essential part of the general theory of science, and discussions on general problems are included. Articles on methodology and historical problems; presentations covering psychological models, cybernetics, methodology, and applications to teaching are reviewed. T.M.R.

N73-30076# Indian National Scientific Documentation Centre, New Delhi.

SCIENTIFIC CREATIVITY, PART 3

1972 276 p refs Transl. into ENGLISH from the publ. "Nauchnoe Tvorchestvo" Moscow, Nauka, 1969 p 577-850 Sponsored by NSF 3 Vol.

(TT-70-57147-3) Avail: NTIS HC $3.00 CSCL 05K

For Abstract, see N73-30074.

N73-30077# Naval Postgraduate School, Monterey, Calif.

SUBJECTIVE AND PHYSIOLOGICAL INDICATORS OF FATIGUE IN A VIGILANCE TASK M.S. Thesis

Henry Edgar Innes Mar. 1973 44 p refs

(AD-761503) Avail: NTIS CSCL 06/16

The research represents an investigation to determine intra-correlations among physiological parameters, a subjective rating of fatigue and performance during a vigilance task. Simple and multivariate analyses indicate positive relationships between subjective ratings of fatigue and heart rate, neck muscle tension level and two measures of sinus arryhthmia. Subjective ratings were correlated with time-on-task. Effects of motivation on sinus arryhthmia are discussed in the context of information processing. Single variate correlations between performance and heart rate, as well as with subjective ratings of fatigue, were observed. Multivariate correlation of neck muscle tension level and sinus arryhthmia was obtained. (Modified author abstract) GRA

N73-30078* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

TILTING TABLE FOR ERGOMETER AND FOR OTHER BIOMEDICAL DEVICES Patent

Raymond L. Gause and Raymond A. Spier, inventors (to NASA) Issued 7 Aug. 1973 8 p Filed 8 May 1972 Supersedes N72-25127 (10 - 16, p 2114)

(NASA-Case-MFS-21010-1; US-Patent-3,750,479; US-Patent-Appl-SN-251609; US-Patent-Class-73-379) Avail: US Patent Office CSCL 06B

The apparatus is for testing the human body in a variety of positions, ranging from the vertical to the supine, while exercising on an ergometer; and can also be used for angular positioning of other biomedical devices. It includes a floor plate and a hinged plate upon which to fix the ergometer, a back rest and a head rest attached at right angles to said hinged plate and behind the seat of the ergometer, dual hydraulic cylinders for raising and lowering the hinged plate through 90 deg by means of a self contained hydraulic system, with valve means for control and positive stops on the apparatus to prevent over travel. Tests can be made with the subject positioned on the seat of the ergometer, through the various angles, with a substantially normal body attitude relative to the seat and ergometer.

Official Gazette of the U.S. Patent Office

N73-30079*# Translation Consultants, Ltd., Arlington, Va.

ERGONOMICS: PRINCIPLES AND RECOMMENDATIONS, NO. 1

V. P. Zinchenko, ed. Washington NASA Jun. 1973 237 p refs Transl. into ENGLISH of the book "Ergonomika: Printsipy i Rekomedatsii, Vyt. 1" Moscow, All-Union Sci. Res. Inst. for Aesthetic Styling in Eng., 1970 246 p

(Contract NASw-2030)

(NASA-TT-F-716) Avail: NTIS HC $3.00

An attempt was made to write creative theoretical, methodological, and normative materials that consider the human factor when designing new technologies, particularly automated control systems. Special attention is devoted to principles of job analysis, to the construction of informative models, and to experimental methods of making ergonomic investigtions.

N73-30080* Translation Consultants, Ltd., Arlington, Va.

ERGONOMIC PREREQUISITES FOR ARTISTIC DESIGNING

V. M. Munipov, V. P. Zinchenko, B. F. Lomov, and P. Ya. Shlayen *In its* Ergonomics: Principles and Recommendations, No. 1 (NASA-TT-F-716) Aug. 1973 p 126 refs Transl. into ENGLISH from the book "Ergonomika: Printsipy i Rekomedatsii, Vyp. 1" Moscow, All-Union Sci. Res. Inst. for Aesthetic Styling in Eng., 1970 p 5-32

An analysis was made of current problems of ergonomics and engineering psychology as well as certain aspects of the interaction between artists-designers and ergonomists in the planning process. Author

N73-30081* Translation Consultants, Ltd., Arlington, Va.

ANALYSIS OF OPERATOR PARTICIPATION

G. M. Zarakovskiy and V. P. Zinchenko *In its* Ergonomics: Principles and Recommendations, No. 1 (NASA-TT-F-716) Jun. 1973 p 27-46 refs Transl. into ENGLISH from the book "Ergonomika: Printsipy i Rekomedatsii, Vyp. 1" Moscow, All-Union Sci. Res. Inst. for Aesthetic Styling in Eng., 1970 p 33-53

The problem of providing a psychological conception of the analysis of operator participation in a form that will allow the qualitative approach to be combined with the quantitative approach is examined. This conception is based on an understanding of the essence of human endeavor in automated control systems that now determine the development of society's productive forces and that are the main object of ergonomic research. Two main types of operator participation were examined; information retrieval with immediate service and information retrieval with delayed service. Author

N73-30082* Translation Consultants, Ltd., Arlington, Va.
DESIGNING CONTROL SYSTEM INFORMATION MODELS
K. I. Panin and V. P. Zinchenko *In its* Ergonomics: Principles and recommendations, No. 1 (NASA-TT-F-716) Jun. 1973 p 47-82 refs Transl. into ENGLISH from the book "Ergonomika: Printsipy i Rekomedatsii, Vyp. 1" Moscow, All-Union Sci. Res. Inst. for Aesthetic Styling in Eng., 1970 p 55-90

Problems encountered in modeling information models are discussed. Data cover condition, functioning of the object of control, and the environment involved in the control. Other parameters needed for the model include: (1) information for forming an image of the real situation, (2) data for analyzing and evaluating an evolving situation, (3) planning actions, and (4) data for observing and evaluating the results of model realization. Author

N73-30083* Translation Consultants, Ltd., Arlington, Va.
RESEARCH PRINCIPLES AND THE CONSTRUCTION OF MNEMONIC DIAGRAMS
V. F. Venda and A. A. Mitkin *In its* Ergonomics: Principles and Recommendations, No. 1 (NASA-TT-F-716) Jun. 1973 p 83-126 refs Transl. into ENGLISH from the book "Ergonomika: Printsipy i Rekomedatsii, Vyp. 1" Moscow, All-Union Sci. Res. Inst. for Aesthetic Styling in Eng., 1970 p 91-126

Mnemonic diagrams are defined as a variety of information display devices, the essential element of which is conventional graphical presentation of technological or functional-operational links in a controlled system or object. Graphically displaying the operational structure of an object, the interdependence between different parameters, and the interdependence between indicators and control organs, the mnemonic diagram reduces the load on the operator's memory and facilitates perception and reprocessing of information and decision making, while at the same time playing the role of visual support to the information activity of the operator. The types of mnemonic diagrams are listed. Author

N73-30084* Translation Consultants, Ltd., Arlington, Va.
FUNCTIONAL STATES OF THE OPERATOR
V. I. Medvedev *In its* Ergonomics: Principles and Recommendations, No. 1 (NASA-TT-F-716) Jun. 1973 p 119-151 refs Transl. into ENGLISH from the book "Ergonomika: Printsipy i Rekomedatsii, Vyp. 1" Moscow, All-Union Sci. Res. Inst. for Aesthetic Styling in Eng., 1970 p 127-159

A study was made of the changes that occur in the functional state of the operator as he does his job. The functional state of the operator is understood to mean the available characteristics of his functions and qualities which, directly or indirectly, determine how he receives, processes, and reads out information. These characteristics change, depending on many conditions found on the job, and can be higher or lower, than those values which exist in the so-called operator rest state, when the person is doing nothing, but is ready to act. A number of environmental factors, directly or indirectly related to the job, act on the operator controlling a system. Analysis of the causes of changes in the functional state suggests they can be broken down into two main groups: those associated with the physical characteristics of the influencing factors, and those attributable to the informational structure of the signals. There are as well many internal causes, primarily changes in the basic properties of those functions on which operator performance depends for the most part, that affect the functional state. Author

N73-30085* Translation Consultants, Ltd., Arlington, Va.
EMOTIONAL STATE AND EFFICIENCY
O. V. Ovchinnikova *In its* Ergonomics: Principles and Recommendations, No. 1 (NASA-TT-F-716) Jun. 1973 p 152-164 refs Transl. into ENGLISH from the book "Ergonomika: Printsipy i Rekomedatsii, Vyp. 1" Moscow, All-Union Sci. Res. Inst. for Aesthetic Styling in Eng., 1970 p 152-164

An investigation was made of the effect of emotional states - negative and positive - on work performance. Data cover intensity of emotional arousal, personality characteristics of person involved, typological features of person's nervous system, emotional stability of person, and past experience of person. Particular attention was given to emotional stress effects on efficiency, given modern working conditions. E.H.W.

N73-30086* Translation Consultants, Ltd., Arlington, Va.
ERGONOMICS RESEARCH METHODS
S. I. Uspenskiy, S. V Yermakova, L. D. Chaynova, A. A. Mitkin, T. M Gushcheva, Yu. K. Strelkov, and N. F. Tsvetkova *In its* Ergonomics: Principles and recommendations, No. 1 (NASA-TT-F-716) Jun. 1973 p 165-220 refs Transl. into ENGLISH from the book "Ergonomika: Printsipy i Rekomedatsii, Vyp. 1" Moscow, All-Union Sci. Res. Inst. for Aesthetic Styling in Eng., 1970 p 165-220

Various factors used in ergonomic research are given. They are: (1) anthrometric measurement, (2) polyeffector method of assessing the functional state of man, (3) galvanic skin reaction, (4) pneumography, (5) electromyography, (6) electrooculography, and (7) tachestoscopy. A brief summary is given of each factor and includes instrumentation and results. E.H.W.

N73-30087* Translation Consultants, Ltd., Arlington, Va.
EVALUATING THE EFFICIENCY OF MAN-MACHINE SYSTEMS
B. A. Korolev and P. Ya. Shlayen *In its* Ergonomics: Principles and Recommendations, No. 1 (NASA-TT-F-716) Jun. 1973 p 221-230 refs Transl. into ENGLISH from the book "Ergonomika: Printsipy i Rekomedatsii, Vyp. 1" Moscow, All-Union Sci. Res. Inst. for Aesthetic Styling in Eng., 1970 p 236-244

Efficiency and the degree of adaptability of a system to cope with problems presented to it are evaluated. Also evaluated are serial production, possible modernization approaches, and operational procedures. The link between system efficiency and cost criteria are included. E.H.W.

N73-30088*# Techtran Corp., Silver Spring, Md.
SANITATION NORMS OF PERMISSIBLE NOISE IN LIVING ACCOMMODATIONS, PUBLIC BUILDINGS, AND IN THE TERRITORY OF HABITABLE BUILDINGS
P. N. Burgasov Washington NASA Aug. 1973 16 p Transl. into ENGLISH of the publ. "Sanitarnyye Normy Dopustimogo Shuma v Pomeshcheniyakh Zhilykh i Obshchestvennykh Zdaniu i na Territorii Zhiloy Zastroyki" Moscow, Min. of Public Health, 1971 13 p
(Contract NASw-2485)
(NASA-TT-F-15065) Avail: NTIS HC $3.00 CSCL 06I

New noise standards are discribed for various types of houses, rest homes; hospitals, camps, public facilities, and streets in residential areas. Examples are provided for coordinating noise measured levels with the standards, so as to obtain, via calculation and measurements, permissible levels of noise. Author

N73-30089*# LTV Aerospace Corp., Dallas, Tex. Vought Systems Div.
STUDY OF SPACE SHUTTLE EVA/IVA SUPPORT REQUIREMENTS. VOLUME 1: TECHNICAL SUMMARY REPORT
R. J. Copeland, P. W. Wood, Jr., and R. L. Cox 30 Apr. 1973 456 p
(Contract NAS9-12507)
(NASA-CR-133991; T-192-RP05) Avail: NTIS HC $25.00 CSCL 06K

Results are summarized which were obtained for equipment requirements for the space shuttle EVA/IVA pressure suit, life support system, mobility aids, vehicle support provisions, and energy 4 support. An initial study of tasks, guidelines, and constraints and a special task on the impact of a 10 psia orbiter cabin atmosphere are included. Supporting studies not related exclusively to any one group of equipment requirements are also summarized. Representative EVA/IVA task scenarios were defined based on an evaluation of missions and payloads. Analysis of the scenarios resulted in a total of 788 EVA/IVA's in the 1979-1990 time frame, for an average of 1.3 per shuttle flight. Duration was estimated to be under 4 hours on 98% of the EVA/IVA's, and distance from the airlock was determined to be 70 feet or less 96% of the time. Payload water vapor sensitivity was estimated to be significant on 9%-17% of the flights. Further analysis of the scenarios was carried out to determine specific equipment characteristics, such as suit cycle and mobility requirements. Author

N73-30090*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ULTRASONIC BONE DENSITOMETER Patent Application
James M. Hoop, inventor (to NASA) Filed 8 Aug. 1973 14 p
(NASA-Case-MFS-20994-1; US-Patent-Appl-SN-386789) Avail: NTIS HC $3.00 CSCL 06B

A pair of opposed spaced ultrasonic transducers are held within a clamping apparatus closely adjacent the bone being analyzed. These ultrasonic transducers include piezoelectric crystals shaped to direct signals through the bone encompassed in the heel and finger of the subject being tested. A pulse generator is coupled to one of the transducers and generates an electric pulse for causing the transducers to generate an ultrasonic sound wave which is directed through the bone structure to the other transducer. An electric circuit, including an amplifier and a bandpass filter couples the signals from the receiver transducer back to the pulse generator for retriggering the pulse generator at a frequency proportional to the duration that the ultrasonic wave takes to travel through the bone structure being examined. An oscilloscope and frequency counter is coupled to the bandpass filter for determining the frequency that the pulse generator is retriggered so as to determine changes in the calcium content of the bone being analyzed. NASA

N73-30091*# AiResearch Mfg. Co., Los Angeles, Calif.
SPACE SHUTTLE ENVIRONMENTAL AND THERMAL CONTROL/LIFE SUPPORT SYSTEM STUDY Final Report
J. Rousseau 14 Mar. 1973 255 p
(Contract NAS9-11592)
(NASA-CR-134009; Rept-73-9097) Avail: NTIS HC $14.75 CSCL 06K

The study of the space shuttle environmental and thermal control/life support system is summarized. Design approaches, system descriptions, maintenance requirements, testing requirements, instrumentation, and ground support equipment requirements are discussed. F.O.S.

N73-30092*# Analytical Research Labs., Inc., Monrovia, Calif.
EVALUATION OF SPACECRAFT TOXIC GAS REMOVAL AGENTS Final Report
Dec. 1972 49 p *refs*
(Contract NAS9-12360)
(NASA-CR-134013; Rept-3005-F) Avail: NTIS HC $4.50 CSCL 06K

A study of the decomposition of various compounds adsorbed on charcoal was made, with a view toward providing a critical appraisal of previous data from charcoal adsorption studies. It was found that thermal decomposition occurs at temperature lower than previously suspected during the charcoal stripping process. A discussion is presented dealing with the various types of reactions found. A rough, quantitative scheme for correcting previous analytical results is developed and presented. Author

N73-30093# Southampton Univ. (England). Inst. of Sound and Vibration Research.
A SURVEY OF HUMAN RESPONSE TO VIBRATION RESEARCH IN GREAT BRITAIN
M. J. Griffin Mar. 1973 66 p
(ISVR-TR-60) Avail: NTIS HC $5.50

Information obtained from a questionnaire sent to fifty seven groups in Great Britain known to be interested in human response to vibration is presented. The nature of the various simulation facilities and portable vibration recording systems available is listed. Outline descriptions of laboratory and field experiments conducted since 1965 are presented in tabular form. References to reports published since 1965 are provided as well as number of persons employed in studying human response to vibration in Great Britain. Various research programs planned for the future are presented. ESRO

N73-30094# Army Missile Command, Redstone Arsenal, Ala.
HUMAN FACTORS/HUMAN ENGINEERING (HFHE) Engineering Practice Study
Gerald Chaikin 29 Jun. 1973 32 p refs
(Proj. MISC-0904)
(AD-763168) Avail: NTIS CSCL 05/5

The study identifies program, design criteria and guidance documents comprising the HFHE area in military personnel management and prospective program actions incident to evaluating prospective establishment of an HFHE area assignment. (Modified author abstract) GRA

N73-30904 Joint Publications Research Service, Arlington, Va.
CURRENT RESEARCH RESULTS AND FUTURE EFFORTS IN THE PROBLEM OF THE BIOLOGICAL EFFECT OF MICROWAVE RADIATION IN THE DEPARTMENT OF PHYSICAL INJURY AT THE INSTITUTE OF INDUSTRIAL MEDICINE
Henryk Mikolajczyk *In its* Transl. on Eastern Europe: Sci. Affairs, No. 343 (JPRS-59709) 3 Aug. 1973 p 4-15 refs Transl. into ENGLISH from Med. Lotnicza (Warsaw), no. 39, 1972 p 95-104 Presented at Symp. on the Biol. Effect of Microwaves, the Employment of Lasers in Biol. and Med., and Protection against Nonionizing Radiation, Warsaw, 28-30 Oct. 1971

Adrenal cortex activity in rats exposed to microwave radiation and microscopic appearance of mast cells in the mesentery of small intestines of rats exposed to thermal doses of microwave radiation are described. Mitotic division of epithelial cells of cornea and survival duration of normal rats and rats without pituitaries are studied in a microwave radiation field. The effect of acetylcholine, epinephrine, histamine, and serotonin on length of survival to radiation exposed rats is also investigated. J.A.M.

N73-30905 Joint Publications Research Service, Arlington, Va.
PROPOSALS FOR SPECIFICATION OF ALLOWABLE LEVELS OF MICROWAVE RADIATION
Przemyslaw Czerski and Mieczyslaw Piotrowski *In its* Transl. on Eastern Europe: Sci. Affairs, No. 343 (JPRS-59709) 3 Aug. 1973 p 16-28 refs Transl. into ENGLISH from Med. Lotnicza (Warsaw), no. 39, 1972 p 127-139

The U.S. and Soviet standard radiation levels allowable for humans are discussed, including substantiation of these levels. Polish standards for permissible exposure to microwave radiation are also presented. J.A.M.

N73-30983# Joint Publications Research Service, Arlington, Va.
SPACE MEDICINE AND EXTRATERRESTRIAL LIFE
4 Sep. 1973 18 p refs Transl. into ENGLISH from Aviat. Kosmonavt. (USSR), no. 5, 1973 p 38-45
(JPRS-59952) Avail: NTIS HC $3.00

Selected articles on space biology, aerospace medicine, and human factors engineering are presented.

N73-30984 Joint Publications Research Service, Arlington, Va.
WORK AND REST SCHEDULE FOR COSMONAUTS
Ye. Karpov and V. Bodrov *In its* Space Med. and Extraterrestrial Life (JPRS-59952) 4 Sep. 1973 p 1-5 Transl. into ENGLISH from Aviat. Kosmonavt. (USSR), no. 5, 1973 p 38-39

Fulfillment of the program of a space flight and its safety are determined, to a great extent, by the cosmonauts' schedule of labor and rest. When constructing a rational schedule, specialists strive to realize two primary goals: promote fulfillment by the cosmonauts of their occupational duties and insure preservation of the health and ability to work of the cosmonauts during the entire flight. The results of experimental research done under laboratory conditions and during actual space flights make it possible to recommend the following distribution of the daily time budget of each crew member: eight hours for work, eight hours for sleep, two hours and 15 minutes for eating (including 30 minutes apiece for early and late breakfasts and the evening meal, and 45 minutes for the main meal), 45 minutes for personal hygiene, and two hours and 30 minutes for personal time and active rest. Author

N73-30985 Joint Publications Research Service, Arlington, Va.
INVESTIGATING FOR LIFE ON OTHER PLANETS
L. Mukhin *In its* Space Med. and Extraterrestrial Life (JPRS-59952) 4 Sep. 1973 p 6-10 Transl. into ENGLISH from Aviat. Kosmonavt. (USSR), no. 5, 1973 p 40-41

Study of the planets of the solar system using unmanned space devices will make it possible to come to a complete decision on one of the most significant scientific problems, the search for life forms on other planets. The data obtained by the Soviet Venera and Mars stations and the Mariner spacecraft give little basis for optimistic conclusions concerning the existence of life on Mars and Venus. The high temperatures on the surface of Venus completely exclude the possibility of the existence of life systems built on a water-carbon basis. On Mars the limiting factors are strong shortwave solar radiation reaching the surface of the planet and the almost complete absence of free water. Scientists are continuing to investigate this problem. In the coming years experiments are planned to search for life on Mars. The discovery of nonterrestrial forms of life is such an important scientific problem that it has been recognized as necessary to undertake attempts in this direction even if there are very minimal chances of success. Author

N73-30986 Joint Publications Research Service, Arlington, Va.
USING ONBOARD RECORDS FOR MEDICAL PURPOSES

N. Frolov *In its* Space Med. and Extraterrestrial Life (JPRS-59952) 4 Sep. 1973 p 11-14 Transl. into ENGLISH from Aviat. Kosmonaut. (USSR), no. 5, 1973 p 44-45

The extensive introduction of instruments for objective monitoring of flight parameters has made it possible to obtain certain statistically valid data characterizing crew activity in controlling the aircraft and engine and to determine deviations from assigned flight regimes. Data from experiments testify that the objective monitoring instruments are fully suitable for studying pilot activity in flight. They must be used more extensively in practical medical investigations of flights. Doctors will need additional knowledge and the ability to decipher the data of the onboard recorders. However, this will be paid back many times over by more purposeful and differentiated planning of the pilot training process, intensification of the process, and, what is perhaps the most important, it will make it possible to avoid those complications which come with approving for flight a pilot who does not yet have sufficiently well-formed habits. Author

N73-30987*# Naval Biomedical Research Lab., Oakland, Calif.
RELEASE OF BACTERIAL SPORES FROM THE INNER WALLS OF A STAINLESS STEEL CUP SUBJECTED TO THERMAL STRESSES AND MECHANICAL SHOCK
H. Wolochow, M. Chatigny, and J. Hebert Apr. 1973 24 p
(NASA Order W-13450)
(NASA-CR-133868; NBRL-48th-TPR) Avail: NTIS HC $3.25 CSCL 06M

The release and fallout of particulates from surfaces afforded thermal or impact stress is of concern for control of contamination of Mars from planetary landing vehicles. A metal vessel contaminated by aerosols of spores was used as a model system and the fallout of spores as affected by various mechanisms was examined. Thermal stresses simulating those expected on the Mars lander dislodged approximately .01% of the aerosol deposited surface burden as did a landing shock of 8 to 10G deceleration. Spores imprinted by finger or swab contact yielded similar results. In all cases where repeated cycling of temperature, motion, or shock were employed the majority of fallout occurred in the first cycle. Particles released from the surface were predominantly in the size range 1 to 5 microns. Author

N73-30988*# Texas A&M Univ., College Station. Dept. of Plant Sciences.
ANALYTICAL AND RADIO-HISTO-CHEMICAL EXPERIMENTS OF PLANTS AND TISSUE CULTURE CELLS TREATED WITH LUNAR AND TERRESTRIAL MATERIALS
Final Report
Robert S. Halliwell [1973] 127 p refs
(Contract NAS9-12050)
(NASA-CR-134036; BB321-55-407P) Avail: NTIS HC $8.50 CSCL 06C

The nature and mechanisms of the apparent simulation of growth originally observed in plants growing in contact with lunar soil during the Apollo project quarantine are examined. Preliminary experiments employing neutron activated lunar soil indicate uptake of a few elements by plants. It was found that while the preliminary neutron activation technique allowed demonstration of uptake of minerals it presented numerous disadvantages for use in critical experiments directed at elucidating possible mechanisms of stimulation. Author

N73-30989# Civil Aeromedical Inst., Oklahoma City, Okla.
ALCOHOL AND DISORIENTATION RELATED RESPONSES. 6: EFFECTS OF ALCOHOL ON EYE MOVEMENTS AND TRACKING PERFORMANCE DURING LABORATORY ANGULAR ACCELERATIONS ABOUT THE YAW AND PITCH AXES
David J. Schroeder, Richard D. Gilson (Naval Aerospace Med. Res. Lab., Pensacola, Fla.), Frederick E. Guedry (Naval Aerospace Med. Res. Lab., Pensacola, Fla.), and William E. Collins Dec. 1972 15 p refs
(FAA-AM-72-34) Avail: NTIS HC $3.00

Twenty-four young men, equally divided into alcohol and control (no alcohol) groups, performed a compensatory tracking task while stationary and while oscillating about their pitch and their yaw axes in the USN Human Disorientation Device. Alcohol doses were 2.0 ml of vodka per kg of body weight and tests were conducted before drinking and 1, 2, and 4 hours after drinking. In the absence of motion, there was no difference between the groups in tracking error while subjects were in the pitch position; significantly more errors occurred for alcohol subjects in the yaw position one and four hours (but not two hours) after drinking. During motion, one and two hours after drinking, alcohol subjects performed significantly poorer than the nondrinkers and had significantly less control of their eye movements for both axes of stimulation. Absolute error was greater during all sessions for pitch-plane stimulation as compared with yaw-plane stimulation. These degrading effects of alcohol on performance, particularly evident during motion, are discussed from the viewpoint of aviation safety. Author

N73-30990*# Kanner (Leo) Associates, Redwood City, Calif.
FLUOROMETRIC 11-HYDROXY-CORTICOSTEROID ASSAY IN HUMAN BLOOD PLASMA
Ya. Popens, E. Silinsh, and I. Vitols Washington NASA Sep 1973 13 p refs Transl. into ENGLISH from Vopr. Med. Khim. (Moscow), v. 14, no. 6, 1968 p 628-634
(Contract NASw-2481)
(NASA-TT-F-15092) Avail: NTIS HC $3.00 CSCL 06P

A fluorometric method for 11-hydrocorticosteroid determination in human blood plasma is described. A mixture of 60% sulfuric acid and 40% acetic acid was used as a specific fluorescent reagent. Sensitivity of the method if 0.02 micron of hydroxycortisone per ml. Mean probable error of a determination is 4.8%.
Author

N73-30991*# Techtran Corp., Glen Burnie, Md.
V. V. STRELTSOV: THE FOUNDER OF THE SOVIET SCHOOL OF AVIATION-SPACE MEDICINE
Nikolay Aleksandrovich Agadzhanyan Washington NASA Oct. 1973 20 p refs Transl. into ENGLISH from Priroda (Moscow), no. 8, Aug. 1973 P 50-56
(Contract NASw-2485)
(NASA-TT-F-15101) Avail: NTIS HC $3.00 CSCL 04E
An account of the life and work of V. V. Strel'tsov in Soviet aviation medicine is given. Some works and contributions are cited, particularly studies of hypoxia and phylogenetic applications in aviation medicine.
Author

N73-30992*# Techtran Corp., Silver Spring, Md.
THE SECOND ORBITAL FLIGHT
A. Nikolayev Washington NASA Sep. 1973 11 p Transl. into ENGLISH from Aviat. Kosmonavt. (Moscow), no. 7, Jul. 1973 p 32-34
(Contract NASw-2485)
(NASA-TT-F-15076) Avail: NTIS HC $3.00 CSCL 06P
Two manned space flights are described, with emphasis on physical monitoring and aftereffects of the flights.
Author

N73-30993*# Scientific Translation Service, Santa Barbara, Calif.
EFFECT OF CORIOLIS ACCELERATION ON THE VESTIBULAR APPARATUS OF A COSMONAUT AND ITS EXPERIMENTAL STUDY IN THE LABORATORY
F. A. Solodovnik and L. M. Vorobyev Washington NASA Sep. 1973 14 p refs Transl. into ENGLISH from the publ. "Problemy Bioniki" Moscow, Nauka, 1973 p 53-58
(Contract NASw-2483)
(NASA-TT-F-15129) Avail: NTIS HC $3.00 CSCL 06S
Laboratory experiments were conducted to study the effects of Coriolis acceleration on the human vestibular apparatus. Rotation of the test subject in a chair was combined with simultaneous rotation (inclination) of his head in a plane containing the rotation axis of the chair in one case and with simultaneous translational displacement of the head in the other case. The directions of endolymph displacement in the semicircular canals under the action of Coriolis acceleration were determined by recording the horizontal nystagmus with the Neptune device.
Author

N73-30994*# Scientific Translation Service, Santa Barbara, Calif.
SLEEP AND CEREBRAL TEMPERATURE IN THE RAT DURING THE CHRONIC EXPOSURE TO A HOT ENVIRONMENT
J. L. Valatx, B. Roussel, and M. Cure Washington NASA Sep. 1973 26 p refs Transl. into ENGLISH from Brain Res. Amsterdam, v. 55, 1973 p 107-122
(Contract NASw-2483)
(NASA-TT-F-15082) Avail: NTIS HC $3.50 CSCL 06C
The circadian rhythm of sleep and cerebellar temperature were studied in the rat during chronic heat exposure at 20 C, 25 C, 30 C, 34 C, and 36 C of ambient temperature. Cortical, electromyographic electrodes and thermistors were chronically implated. Continuous recordings were made from 30 male subjects for a 3-week period at each step of ambient temperature rise. Results show an increase of sleep time with ambient temperature rise with a maximum at 34 to 35 C. This increase was more important for paradoxical sleep (PS) than for slow wave sleep (SWS). The PS/SWS ratio was 13.6 at 20 C and 19.4 at 34 C. The large fluctuations in cerebellar temperature observed during sleep-waking cycles at 20 to 25 C were reduced at 34 C and 36 C. The mean cerebellar temperature increased with ambient temperature rise. A possible explanation is that in the albino rat without polypnea or sweating, an excessive central temperature rise induced by external thermal load could be prevented by a decrease in basal metabolism and motor activity.
Author

N73-30995*# Behavioral Technology Consultants, Silver Spring, Md.
STATISTICAL EVALUATION OF TIME SERIES ANALYSIS TECHNIQUES
Vernon A. Benignus Jun. 1973 47 p refs
(Contract NAS9-12902)
(NASA-CR-134011) Avail: NTIS HC $4.50 CSCL 06P
The performance of a modified version of NASA's multivariate spectrum analysis program is discussed. A multiple regression model was used to make the revisions. Performance improvements were documented and compared to the standard fast Fourier transform by Monte Carlo techniques.
E.H.W.

N73-30996*# Aerojet Medical and Biological Systems, El Monte, Calif.
TAPE CASSETTE BACTERIA DETECTION SYSTEM Final Report
27 Apr. 1973 93 p refs
(Contract NAS9-12548)
(NASA-CR-134035; Rept-1105-F) Avail: NTIS HC $6.75 CSCL 06M
The design, fabrication, and testing of an automatic bacteria detection system with a zero-g capability and based on the filter-capsule approach is described. This system is intended for monitoring the sterility of regenerated water in a spacecraft. The principle of detection is based on measuring the increase in chemiluminescence produced by the action of bacterial porphyrins (i.e., catalase, cytochromes, etc.) on a luminol-hydrogen peroxide mixture. Since viable as well as nonviable organisms initiate this luminescence, viable organisms are detected by comparing the signal of an incubated water sample with an unincubated control. Higher signals for the former indicate the presence of viable organisms. System features include disposable sealed sterile capsules, each containing a filter membrane, for processing discrete water samples and a tape transport for moving these capsules through a processing sequence which involves sample concentration, nutrient addition, incubation, a 4 Molar Urea wash and reaction with luminol-hydrogen peroxide in front of a photomultiplier tube. Liquids are introduced by means of a syringe needle which pierces a rubber septum contained in the wall of the capsule. Detection thresholds obtained with this unit towards E. coli and S. marcescens assuming a 400 ml water sample are indicated.
Author

N73-30997*# Kanner (Leo) Associates, Redwood City, Calif.
METHODS OF DETERMINATION OF HYDROXYPROLINE IN BIOLOGICAL FLUIDS AND THEIR USE IN CLINICAL PRACTICE
A. A. Krel and L. N. Furtseva Washington NASA Sep. 1973 12 p refs Transl. into ENGLISH from Vopr. Med. Khim. (Moscow), v. 14, no. 6, 1968 p 635-640
(Contract NASw-2481)
(NASA-TT-F-15093) Avail: NTIS HC $3.00 CSCL 06P
A method is modified for determination of hydroxyproline bound to collagen-like plasma proteins and of total urine. The deviation in parallel tests averaged 2%. Values of both the content of plasma protein hydroxyproline and total urine hydroxyproline of normal individuals are given. Changes in the above values in collagenous and bone diseases are briefly discussed.
Author

N73-30998*# Kanner (Leo) Associates, Redwood City, Calif.
FUNCTIONAL TEST WITH A WATER LOAD
Washington NASA Sep. 1973 4 p Transl. into ENGLISH of the publ. "Funktionalnaya Proba s Vodnoy Nagruzkov" Moscow, Acad. of Sci., 1973 3 p
(Contract NASw-2481)
(NASA-TT-F-15091) Avail: NTIS HC $3.00 CSCL 06P
A water load test was performed to evaluate the hydration status of the organism and the functional state of the kidneys

and adrenals during the postflight period. The quantity of water injected was measured after which a precise analysis of the urine and blood was made. Author

N73-30999*# Kanner (Leo) Associates, Redwood City, Calif.
STUDY OF IMMUNOLOGICAL REACTIVITY
Washington NASA Sep. 1973 7 p Transl. into ENGLISH of rept. "Issled. Immunol. Reaktivnosti" Moscow, Acad. Sci. USSR, 1973 6 p
(Contract NASw-2481)
(NASA-TT-F-15089) Avail: NTIS HC $3.00 CSCL 06E

The functional state is determined of the lymphoid cell population circulating in the peripheral blood of the astronauts after space flight. Peculiarities are reported of the process of readaptation of the lymphocytes to earth conditions for several weeks after space flight. Individual peculiarities are also reported of immunoreactivity of astronauts, reflecting changes in the rate of synthesis of RNA and DNA in T-lymphocytes after space flights. Author

N73-31000*# Montana Univ., Missoula.
TELEMETRY EXPERIMENTS WITH A HIBERNATING BLACK BEAR Progress Report
J. J. Craighead, J. R. Varney, J. S. Sumner, and F. C. Craighead, Jr. 30 Jun. 1972 36 p refs
(Grant NGR-27-002-006)
(NASA-CR-133926) Avail: NTIS HC $4.00 CSCL 06C

The objectives of this research were to develop and test telemetry equipment suitable for monitoring physiological parameters and activity of a hibernating bear in its den, to monitor this data and other environmental information with the Nimbus 3 IRLS data collection system, and to refine immobilizing, handling, and other techniques required in future work with wild bears under natural conditions. A temperature-telemetering transmitter was implanted in the abdominal cavity of a captive black bear and body temperature data was recorded continuously during a 3 month hibernation period. Body temperatures ranging between 37.5 and 31.8 C were observed. Body temperature and overall activity were influenced by disturbances and ambient den temperature. Nychthemeral temperature changes were not noticable. A load cell weight recording device was tested for determining weight loss during hibernation. Monitoring of data by satellite was not attempted. The implanted transmitter was removed and the bear was released with a radiolocation collar at the conclusion of the experiment. Author

N73-31001*# Research Triangle Inst., Research Triangle Park, N.C.
NASA APPLICATION TEAM PROGRAM: APPLICATION OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE Final Report, Sep. 1972 - Aug. 1973
31 Aug. 1973 111 p
(Contract NASw-2459)
(NASA-CR-135527) Avail: NTIS HC $7.75 CSCL 06E

The results of the medically related activities of the NASA Application Team Program in technology application for the reporting period September 1, 1972, to August 31, 1973 are reported. The accomplishments of the application team during the reporting period are as follows: The team has identified 39 new problems for investigation, has accomplished 7 technology applications, 4 potential technology applications, 2 impacts, has closed 38 old problems, and has a total of 59 problems under active investigation. Author

N73-31002*# BioTechnology, Inc., Falls Church, Va.
A REVIEW OF THE INFLUENCE OF PHYSICAL CONDITION PARAMETERS ON A TYPICAL AEROSPACE STRESS EFFECT: DECOMPRESSION SICKNESS Final Report
Vita R. West and James F. Parker, Jr. Jun. 1973 54 p refs Sponsored in part by NASA
(Contract N00014-72-C-0263; NR Proj. 309-029)
(NASA-CR-135495; AD-763453) Avail: NTIS HC $4.75 CSCL 06/14

The study examines data on episodes of decompression sickness, particularly from recent Navy work in which the event occurred under multiple stress conditions, to determine the extent to which decompression sickness might be predicted on the basis of personal characteristics such as age, weight, and physical condition. Such information should ultimately be useful for establishing medical selection criteria to screen individuals prior to participation inactivities involving extensive changes in ambient pressure, including those encountered in space operations. The main conclusions were as follows. There is a definite and positive relationship between increasing age and weight and the likelihood of decompression sickness. However, for predictive purposes, the relationship is low. To reduce the risk of bends, particularly for older individuals, strenuous exercise should be avoided immediately after ambient pressure changes. Temperatures should be kept at the low end of the comfort zone. For space activities, pressure changes of over 6-7 psi should be avoided. Prospective participants in future missions such as the Space Shuttle should not be excluded on the basis of age, certainly to age 60, if their general condition is reasonably good and they are not grossly obese. (Modified author abstract) GRA

N73-31003# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
COMBUSTIBILITY AND TOXICITY OF METALS AND ALLOYS, SELECTED ARTICLES
B. M. Zlobinskii, V. G. Ioffe, and V. B. Zlobinskii 29 Jun. 1973 151 p Transl. into ENGLISH of the mono. "Vosplamenyaemost i Toksichnost Metallov i Splavov" Moscow, 1972 p 21-25, 106-126, 191-200, 204-263
(AD-764284; FTD-MT-24-211-73) Avail: NTIS CSCL 06/20

The topics in the report include the following: ignition models; combustibility of mechanical mixtures of powdered metal; diagram of combustibility; mechanism of ignition and burning of powdered metals; mechanism of ignition and burning of aerosols of metals; inter connection between characteristics of the combustibility of aerogels and aerosols of metals; general information of toxicity; classification of substances according to the degree of danger; characteristics of the toxicity; of metals; and characteristics of metals with respect to the danger of their effect. Author (GRA)

N73-31004# Naval Aerospace Medical Research Lab., Pensacola, Fla.
THE MEASUREMENT OF PULMONARY EXTRAVASCULAR WATER VOLUME DURING EXPOSURE TO SIMULATED HIGH ALTITUDE
Raphael F. Smith and Lloyd H. Ramsey 3 Jan. 1973 17 p refs
(MR0410101)
(AD-763355; NAMRL-1176) Avail: NTIS CSCL 06/19

To investigate basic mechanisms operative in high altitude pulmonary edema, pulmonary extravascular water volume (Qpevw) was measured in 11 unanesthetized calves exposed to atmospheres equivalent to 12,000 and 16,000 feet. Measurements were made by a double indicator dilution technique at sea level and after continuous exposure of 24, 48, and 72 hours. Thirty-five duplicate measurements from 15 experiments yielded a test-retest reliability coefficient of 0.84. Data from 15 experiments were technically satisfactory after exposure of 24 hours; 13 experiments after 48 hours exposure; and 7 experiments after 72 hours exposure. After 24 hours exposure the mean increase in Qpevw was 42.7 ml (p-.025); after 48 hours 79.3 ml (p-.005); and after 72 hours, 29.3 ml (N.S.). There was no significant difference in Qpevw for the same duration of exposure at 12,000 feet and 16,000 feet. It is concluded that Qpevw increases in the bovine lung after exposure to high altitude. Author (GRA)

N73-31005# Naval Submarine Medical Research Lab., Groton, Conn.
THE BOHR EFFECT IN CHRONIC HYPERCAPNIA Medical

Research Progress Report No. 3
Arthur A. Messier and Karl E. Schaefer 13 Dec. 1972 17 p refs
(AD-763394; NSMRL-732) Avail: NTIS CSCL 06/19

The study investigates whether the changes in oxygen affinity produced by exposure to 15% CO2, which affects oxygen transport by reducing oxygen delivery at the tissue level, would be compensated by changes in the Bohr effect. The Bohr effect showed a marked increase during chronic exposure to 15% CO2. The effective Bohr effect, which is the additional oxygen released at 50% oxyhemoglobin saturation (P50) when blood is acidified from pH 7.4 to 7.3, was found to be elevated during the periods of greatest respiratory stress. These findings are of interest to personnel concerned with toxicological aspects of increased carbon dioxide exposure as potentially found in Navy submarine and diving environments as well as other hazards which might induce an acidosis such as hyperbaric hyperoxia. GRA

N73-31006*# Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
ICE PACK HEAT SINK SUBSYSTEM - PHASE 1, VOLUME 1
George J. Roebelen, Jr. Jun. 1973 210 p refs 2 Vol.
(Contract NAS2-7011)
(NASA-CR-114624-Vol-1; SVHSER-6223-Vol-1) Avail: NTIS HC $12.50 CSCL 06K

The design, development, fabrication, and test at one-g of a functional laboratory model (non-flight) ice pack heat sink subsystem to be used eventually for astronaut cooling during manned space missions are discussed. In normal use, excess heat in the liquid cooling garment (LCG) coolant is transferred to a reusable/regenerable ice pack heat sink. For emergency operation, or for extension of extravehicular activity mission time after all the ice has melted, water from the ice pack is boiled to vacuum, thereby continuing to remove heat from the LCG coolant. This subsystem incorporates a quick connect/disconnect thermal interface between the ice pack heat sink and the subsystem heat exchanger. Author

N73-31007*# LTV Aerospace Corp., Dallas, Tex. Vought Systems Div.
STUDY OF SPACE SHUTTLE EVA/IVA SUPPORT REQUIREMENTS. VOLUME 2: EVA/IVA TASKS, GUIDELINES, AND CONSTRAINTS DEFINITION
B. W. Webbon, R. J. Copeland, P. W. Wood, Jr., and R. L. Cox 30 Apr. 1973 289 p refs
(Contract NAS9-12507)
(NASA-CR-133992; T-192-RP05-Vol-2) Avail: NTIS HC $16.50 CSCL 22B

The guidelines for EVA and IVA tasks to be performed on the space shuttle are defined. In deriving tasks, guidelines, and constraints, payloads were first identified from the mission model. Payload requirements, together with man and manipulator capabilities, vehicle characteristics and operation, and safety considerations led to a definition of candidate tasks. Guidelines and constraints were also established from these considerations. Scenarios were established, and screening criteria, such as commonality of EVA and IVA activities, were applied to derive representative planned and unplanned tasks. The whole spectrum of credible contingency situations with a potential requirement for EVA/IVA was analyzed. Author

N73-31008*# ILC Industries, Inc., Dover, Del.
STUDY OF SPACE SHUTTLE EVA/IVA SUPPORT REQUIREMENTS. VOLUME 3: REQUIREMENTS STUDY FOR SPACE SHUTTLE PRESSURE SUITS Final Report
19 Dec. 1972 261 p refs Prepared for LTV Aerospace Corp., Dallas
(Contract NAS9-12507; LTVAC Order 826814-UZ)
(NASA-CR-133993; ER-051-01; T-192-RP05-Vol-3) Avail: NTIS HC $15.25 CSCL 06K

The performance and design requirements for the space shuttle EVA and IVA pressure suits were investigated. A systems analysis was conducted to determine the characteristics and human factors design considerations for the pressure suit. The three major topics considered are: (1) mission parameters, (2) suit requirements, and (3) utilization of contemporary suit designs. The distinct and separate needs of all crew members, passengers, and/or EVA crewman were analyzed. Author

N73-31009*# LTV Aerospace Corp., Dallas, Tex. Vought Systems Div.
STUDY OF SPACE SHUTTLE EVA/IVA SUPPORT REQUIREMENTS. VOLUME 4: REQUIREMENTS STUDY FOR SPACE SHUTTLE MOBILITY AIDS
P. W. Wood, Jr. 30 Apr. 1973 147 p refs
(Contract NAS9-12507)
(NASA-CR-133994; T-192-RP05-Vol-4) Avail: NTIS HC $9.50 CSCL 06K

The requirements for mobility aids and restraint devices for use by personnel of the space shuttle were investigated. The devices considered were as follows: (1) translational devices to assist crewmen in moving from place to place and in moving equipment, (2) restraint devices for crewman at the worksite to prevent undesired induced motion between the crewman and the worksite, and (3) other necessary worksite provisions. Existing devices in each category are reviewed and new concepts are generated as required. Diagrams and line drawings of items of equipment are provided. Author

N73-31010*# LTV Aerospace Corp., Dallas, Tex. Vought Systems Div.
STUDY OF SPACE SHUTTLE EVA/IVA SUPPORT REQUIREMENTS. VOLUME 5: REQUIREMENTS STUDY FOR SPACE SHUTTLE EMERGENCY 4 SUPPORT
R. J. Copeland and R. L. Cox 30 Apr. 1973 200 p refs
(Contract NAS9-12507)
(NASA-CR-133995; T-192-RP05-Vol-5) Avail: NTIS HC $12.00 CSCL 06K

The requirements for space shuttle emergency intravehicular activity support equipment are discussed. The potential emergencies considered are: (1) contaminated atmosphere, (2) accidental decompression, (3) inability to re-enter, and (4) crewman stranded. Contingency life support systems are described and the effectiveness of each emergency procedure is analyzed. Author

N73-31011*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RAW LIQUID WASTE TREATMENT SYSTEM AND PROCESS Patent Application
Marshall F. Humphrey, inventor (to NASA) Filed 22 Aug. 1973 24 p
(Contract NAS7-100)
(NASA-Case-NPO-13224-1; US-Patent-Appl-SN-390467) Avail: NTIS HC $3.25 CSCL 06I

A description is given of a raw sewage treatment process where all organic matter is dissolved in the sewage liquid. All non-dissolved matter suspended in the sewage is pyrolyzed to form an activated carbon and ash materials without addition of any conditioning agents. The activated carbon and ash material is added to the water from which the non-dissolved matter was removed. The activated carbon and ash material adsorbs the organic matter which is dissolved in the water and is thereafter supplied in a counter current flow direction, and combines with the incoming raw sewage to facilitate the separation of non-dissolved settleable materials from the sewage water. The used carbon and ash material together with the non-dissolved matter which was separated from the sewage water are pyrolyzed to form the activated carbon and ash material. NASA

N73-31012*# Purdue Univ., Lafayette, Ind.
HEATING OF FOOD IN MODIFIED ATMOSPHERES Final Report
Vincent E. Sweat [1973] 116 p refs
(Contract NAS9-10823)

(NASA-CR-134040) Avail: NTIS HC $8.00 CSCL 06H

Food heating tests were conducted with two model foods: a Carnation turkey salad sandwich spread and frankfurter chunks in a sauce of water and agar. For the first series of tests comparing heating in five different atmospheres, the atmospheres were: (1) air at atmospheric pressure, (2) air at 5 psia, (3) helium at 5 psia, (4) oxygen-nitrogen mixture at 5 psia, and (5) oxygen-helium mixture at 5 psia. No significant differences in heating rates were caused by varying the atmosphere. Initial food temperatures were varied in the next series of tests. Heating times were found to increase with decreasing initial temperatures. There were also differences in heating times between the two foods used. Author

N73-31013*# Energy Research Corp., Bethel, Conn.

CARBON DIOXIDE ADSORBENT STUDY Final Report

Michael Onischak and Bernard S. Baker Sep. 1973 47 p refs

(Contract NAS2-7023)

(NASA-CR-114661) Avail: NTIS HC $4.50 CSCL 06K

A study was initiated on the feasibility of using the alkali metal carbonate - bi-carbonate solid-gas reaction to remove carbon dioxide from the atmosphere of an EVA life support system. The program successfully demonstrates that carbon dioxide concentrations could be maintained below 0.1 mole per cent using this chemistry. Further a practical method for distributing the carbonates in a coherent sheet form capable of repeated regeneration (50 cycles) at modest temperatures (423 K), without loss in activity was also demonstrated. Sufficiently high reaction rates were shown to be possible with the carbonate - bi-carbonate system such that EVA hardware could be readily designed. Experimental and design data were presented on the basis of which two practical units were designed. In addition to conventional thermally regenerative systems very compact units using ambient temperature cyclic vacuum regeneration may also be feasible. For a one man - 8 hour EVA unit regenerated thermally at the base ship a system volume of 14 liters is estimated. Author

N73-31014# Aeronautical Research Labs., Melbourne (Australia).

THE PROTECTIVE PERFORMANCE OF CRASH HELMETS

S. R. Sarrailue Mar. 1973 41 p refs

(ARL/SM-Note-390) Avail: NTIS HC $4.25

Crash helmets for use in agricultural aviation should provide good impact protection, be light and comfortable and give acoustical protection. Satisfactory impact protection should be assured by standard specifications. To examine the performance of current helmets and suitability of typical standards, a series of tests was conducted on ten types of helmet, and their performance was compared with standard requirements and head tolerance to impact. Standard specifications were reviewed and it was concluded that they should, and could, be modified to require improved protection. The comfort aspects were investigated in a brief field trial to indicate design characteristics suitable for aviation helmets. Author

N73-31015*# Kanner (Leo) Associates, Redwood City, Calif.

SOME PROPERTIES OF A MATHEMATICAL ANALOG OF THE CENTRAL PORTION OF A VESTIBULAR ANALYZER

O. G. Gazenko and N. A. Chekhonadskiy Washington NASA Sep. 1973 15 p refs Transl. into ENGLISH of the book "Problemy Bioniki" Moscow, Nauka Press, 1973 p 45-53

(Contract NASw-2481)

(NASA-TT-F-15130) Avail: NTIS HC $3.00 CSCL 06B

Neuron response in the central region of a vestibular analyzer on exposure to periodically-varying acceleration is analyzed by mathematical simulation methods. The firing rate of the otolith receptors during oscillatory vertical movement is shown to vary sinusoidally with the same frequency of the oscillatory vertical movement. However, the firing rate does exhibit a phase shift relative to the vertical acceleration: the phase shift is dependent on the time constant of the otolith receptors. The two types of otolith receptors (one type located at the anterior macular crista and the other in the center of the macula) differ by their time constants. Author

N73-31016*# General Electric Co., Philadelphia, Pa.

WATER RECOVERY AND SOLID WASTE PROCESSING FOR AEROSPACE AND DOMESTIC APPLICATIONS. VOLUME 2: APPENDICES

R. W. Murray 21 May 1973 127 p

(Contract NAS9-12505)

(NASA-CR-134027; DOC-73SD4236-Vol-2) Avail: NTIS HC $8.50 CSCL 06I

Water and sewage treatment systems are presented with concentration on the filtration of water. Equipment is described for organic removal, solids removal, nutrient removal, inorganic removal, and disinfection of the water. Such things as aseline hardware, additional piping connections, waste disposal, and costs involved are also reported. T.M.R.

N73-31017*# General Electric Co., Philadelphia, Pa. Space Div.

WATER RECOVERY AND SOLID WASTE PROCESSING FOR AEROSPACE AND DOMESTIC APPLICATIONS. VOLUME 1: FINAL REPORT

R. W. Murray 21 May 1973 155 p

(Contract NAS9-12505)

(NASA-CR-134028; DOC-73SD4236-Vol-1) Avail: NTIS HC $9.75 CSCL 06I

A comprehensive study of advanced water recovery and solid waste processing techniques employed in both aerospace and domestic or commercial applications is reported. A systems approach was used to synthesize a prototype system design of an advanced water treatment/waste processing system. Household water use characteristics were studied and modified through the use of low water use devices and a limited amount of water reuse. This modified household system was then used as a baseline system for development of several water treatment waste processing systems employing advanced techniques. A hybrid of these systems was next developed and a preliminary design was generated to define system and hardware functions. Author

N73-31018*# MSA Research Corp., Evans City, Pa.

DEVELOPMENT OF SYSTEM DESIGN INFORMATION FOR CARBON DIOXIDE USING AN AMINE TYPE SORBER Final Report, 18 Nov. 1969 - 12 Feb. 1971

R. L. Rankin, F. Roehlich, and F. Vancheri 15 Jun. 1971 91 p refs

(Contract NAS1-7263)

(NASA-CR-111849) Avail: NTIS HC $6.75 CSCL 06K

Development work on system design information for amine type carbon dioxide sorber is reported. Amberlite IR-45, an aminated styrene divinyl benzene matrix, was investigated to determine the influence of design parameters of sorber particle size, process flow rate, CO2 partial pressure, total pressure, and bed designs. CO2 capacity and energy requirements for a 4-man size system were related mathematically to important operational parameters. Some fundamental studies in CO2 sorber capacity, energy requirements, and process operation were also performed. Author

N73-31019*# Martin Marietta Corp., Denver, Colo.

DESIGN, FABRICATION AND ACCEPTANCE TESTING OF A ZERO GRAVITY WHOLE BODY SHOWER, VOLUME 1 Final Report

Jul. 1973 216 p refs

(Contract NAS1-11339)

(NASA-CR-134066; MCR-73-172-Vol-1) Avail: NTIS HC $13.00 CSCL 06I

The effort to design whole body shower for the space station prototype is reported. Clothes and dish washer/dryer concepts were formulated with consideration given to integrating such a system with the overall shower design. Water recycling methods to effect vehicle weight savings were investigated and it was concluded that reusing wash and/or rinse water resulted in weight savings which were not sufficient to outweigh the added degree of hardware complexity. The formulation of preliminary and final designs for the shower are described. A detailed comparison of the air drag vs. vacuum pickup method was prepared that indicated the air drag concept results in more severe space

station weight penalties; therefore, the preliminary system design was based on utilizing the vacuum pickup method. Tests were performed to determine the optimum methods of storing, heating and sterilizing the cleansing agent utilized in the shower; it was concluded that individual packages of pre-sterilized cleansing agent should be used. Integration features with the space station prototype system were defined and incorporated into the shower design as necessary. Author

N73-31020*# Essex Corp., Alexandria, Va.
THE ROLE OF MAN IN FLIGHT EXPERIMENT PAYLOAD MISSIONS. VOLUME 1: RESULTS
Thomas B. Malone Aug. 1973 34 p 2 Vol.
(Contract NASw-2389)
(NASA-CR-135487) Avail: NTIS HC $3.75 CSCL 05E

It is pointed out that a controversy exists concerning the required role of man, and his attendant skills and levels of skills, for Sortie Lab operations. As a result, a study was conducted to generate a taxonomy of candidate crew roles which would: (1) be applicable across all experiments, and (2) be usable for Sortie scientists and engineers in determination of level of skill as well as type of skill. Nine basic roles were identified in the study, and the tasks associated with each were developed from a functional description of a generalized in-flight experiment. The functional analysis comprised the baseline for establishment of crew roles, with roles being defined as combinations of tasks, associated skills, and knowledges. A role classification scheme was developed in which the functions and tasks identified were allocated to each of the nine role types. This classification scheme is presented together with the significant results of the study. D.L.G.

N73-31021*# Essex Corp., Alexandria, Va.
THE ROLE OF MAN IN FLIGHT EXPERIMENT PAYLOAD MISSIONS. VOLUME 2: APPENDICES
Thomas B. Malone Aug. 1973 84 p 2 Vol.
(Contract NASw-2389)
(NASA-CR-135488) Avail: NTIS HC $6.25 CSCL 05E

In the study to determine the role of man in Sortie Lab operations, a functional model of a generalized experiment system was developed. The results are presented of a requirements analysis which was conducted to identify performance requirements, information requirements, and interface requirements associated with each function in the model. D.L.G.

N73-31022# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
CHANGE IN CIRCADIAN RHYTHM OF PSYCHOMOTOR PERFORMANCE AFTER TRANSMERIDIAN FLIGHTS Ph.D. Thesis - Bonn Univ.
Michael Bodanowitz 6 Mar. 1973 48 p refs In GERMAN; ENGLISH summary
(DLR-FB-73-52) Avail: NTIS HC $4.50; DFVLR, Porz, West Ger. 15.30 DM

Psychomotor performance of eight students was studied at 3 hour intervals during periods of 24 hours before and after flights between Germany and the U.S.A. Two 24 hour preflight periods revealed the basic normal daily rhythm of the psychomotor performance. Effects of a 6 hour time shift were evaluated by determining the psychomotor performance on day 1, 3, 5, and 8 following the flights in each direction. A desynchronization with local time was observed after flights in both directions. The changes were more pronounced and longer lasting after the west-east flight. The resychronization-time amounted to 5 days after the westward travel and 8 days after the eastward flight. Author (ESRO)

N73-31023# Royal Naval Personnel Research Committee, London (England).
PERCEPTUAL CONFUSIONS BETWEEN FOUR-DIMENSIONAL SOUNDS
J. C. Webster, Muriel M. Woodhead, and Alan Carpenter Med. Res. Council Aug. 1971 23 p refs
(OES-6/72; BR-35741) Avail: NTIS HC $3.25

Whether the main characteristics of nonspeech sounds are identified in the same way as those of speech was investigated. If so, it would be useful to transform marine sounds into a speech mode for analysis. The dimensions were source waveform, fundamental frequency, and formant number and position of sixteen steady-state meaningless complex sounds, incorporating speech-like and engine-like aspects. Waveform and fundamental frequency were shown to be less confusing than formant changes. Thus, the nonspeech sounds were not perceived in the same way as speech. ESRO

N73-31024# Royal Naval Personnel Research Committee, London (England).
EFFICIENCY IN HEAT AFTER A NIGHT WITHOUT SLEEP
E. C. Poulton, R. S. Edwards, and W. P. Colquhoun Med. Res. Council Dec. 1971 34 p refs
(OES-8/72; BR-35739) Avail: NTIS HC $3.75

Twelve naval ratings performed 3 tasks after 1 night without sleep, in moderate heat of 38/32 C (100/90F), and with 2 stresses combined, as well as a control condition. The 3 tasks were tracking, in order: tracking with peripheral lights, the 5 choice task, and an auditory vigilance task. There was a reliable interaction between the 2 stresses, but only at the start of the auditory vigilance task. The detrimental effect of the 2 stresses combined was reliably less than the sum of the 2 separate detrimental effects. Since by definition loss of sleep reduces the level of arousal, it is concluded that mild heat must increase arousal. On the 5 choice task, both the loss of sleep and the heat had an immediate reliable effect as soon as the ratings started work. The combined effect of the 2 stresses increased reliably less over time than did the sum of the 2 separate stresses. On the tracking with peripheral lights and on the auditory vigilance task, the trends were reversed. Loss of sleep and heat did not have much immediate effect, and the combined effect of the 2 stresses increased reliably more over time than did the sum of the 2 separate effects. Author (ESRO)

N73-31025# Naval Postgraduate School, Monterey, Calif.
CURRENT VERSUS STAGNANT JET PILOTS' RESPONSE TIMES: A COMPARISON M.S. Thesis
John H. Smittle Mar. 1973 40 p refs
(AD-761463) Avail: NTIS CSCL 05/9

An attempt was made to determine if one of the basic piloting skills was lost during prolonged periods of nonflying. Current and stagnant groups of jet Naval aviators were tasked with responding to a sequence of sixty slides of an aircraft attitude indicator. The Subjects' response times were measured. The slides depicted twelve different aircraft attitudes. Although no significant difference was found between groups, a definite learning trend was established. The subjects were reassigned into more experienced and less experienced groups. The more experienced group performed significantly better. Author (GRA)

N73-31026# National Bureau of Standards, Boulder, Colo. Cryogenics Div.
INSULATION OF LIQUID OXYGEN DEWARS Final Report
Charles F. Sindt Apr. 1973 46 p refs Previously announced as COM-73-10761
(NBS Proj. 2750554; NAEC Proj. PO-2-8061)
(AD-763325; NBSIR-73-308; COM-73-10761) Avail: NTIS CSCL 06/11

The Navy has experienced failure of vacuum insulation in dewars used for storage and handling of liquefied breathing oxygen for aircraft pilots. Because of the vacuum insulation failures, a search was made for a more rugged insulation that has thermal performance similar to the currently used vacuum with multilayer or powder. No system was found that compared in thermal performance and did not require a vacuum. Two systems were experimentally evaluated that did not require vacuum. One was polyurethane foam with an intermediate fiber glass shell and the other was glass bubbles in argon gas at one atmosphere pressure. The polyurethane foam system was successful in that

no cracks penetrated to the outside surface; however, the average thermal conductivity was about 15 times greater than vacuum and powder. (Modified author abstract) GRA

N73-31854 National Research Council of Canada, Ottawa (Ontario). Control System Lab.

SLEEP DEPRIVATION EFFECTS ON ACCURACY AND SPEED OF RESPONSE SELECTION AND EXECUTION

Leslie Buck *In its* Quart. Bull. of the Div. of Mech. Eng. and the Natl. Aeron. Estab. 30 Jun. 1973 p 1-12 refs

Sleeping subjects performed a subject-paced step-tracking task after zero, one and two nights without sleep. Their performance compared to performance when following a similar regime with normal sleep showed no change in accuracy but a progressive reduction in speed. Movement times increased with sleep loss and reaction times increased to an amount dependent on signal probability. Author

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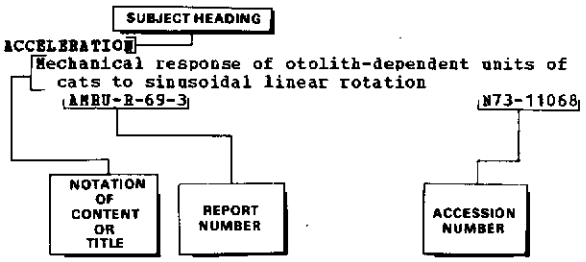

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C

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H

J

K

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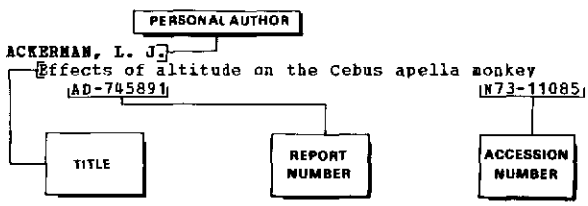

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